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# ENVIRONMENTAL IMPACT ASSESSMENT REPORT (EIAR) FOR THE PROPOSED BALLINAGREE WIND FARM, CO. CORK

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## VOLUME 1 – NON-TECHNICAL SUMMARY

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Prepared for: Ballinagree Wind DAC



**Ballinagree**  
Wind farm

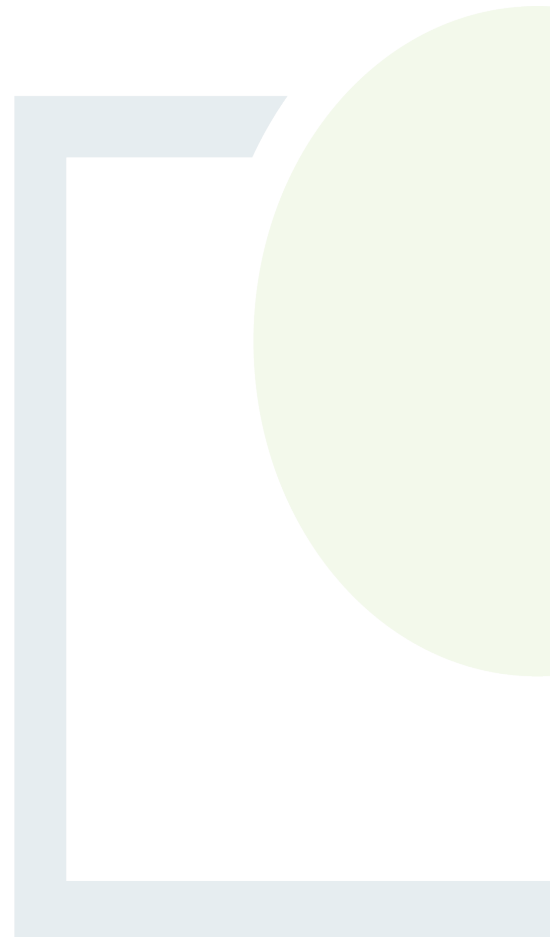
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## 1. INTRODUCTION

Fehily Timoney & Company (FT) has prepared the environmental impact assessment report (EIAR) on behalf of Ballinagree Wind DAC. Ballinagree Wind DAC intends to apply to An Bord Pleanála to seek planning consent for the proposed Ballinagree Wind Farm in County Cork. Ballinagree Wind Farm DAC is a joint venture between FuturEnergy Ireland and Ørsted.

The proposed project assessed in this EIAR is comprised of the following key elements:

The wind farm site, consisting of 20 turbines within the townlands of Annagannihy, Ballynagree East, Ballynagree West, Carrigagulla, Carrigduff, Finnanfield, Inchamay South and Knocknagappul, Co. Cork.

The grid connection is a 110kV underground electrical cable from the wind farm site to the existing 110 / 220kV substation at Clashavoon, within the townland of Aughinida, Co. Cork. The grid connection will traverse the townlands of Clonavrick, Knocknagappul, Ballynagree East, Bawnmore, Ballynagree West, Derryroe, Rahalisk, Kilberrihert, Caherbaroul, Aughinida, Co. Cork

The turbine delivery route and associated accommodation works required to deliver the turbines to the wind farm site. Accommodation works included in the planning application include works within the townlands of Dromagh, Dromskehy, Drishane More, Tullig, Drominahilla and Ballinagree East, Co. Cork.

Biodiversity enhancement measures on lands proximate to the wind farm site. Four private landowners with a combined total of c. 304 ha of lands in the vicinity of the wind farm, but beyond 250m of any proposed turbine, have agreed to a long-term commitment to detailed land management measures designed to maintain and enhance local biodiversity. In addition, the Developer has undertaken to create wildlife corridors through strategic tree-felling between areas of open upland habitat in the vicinity of the proposed wind farm area. These lands are located primarily outside of the redline boundary of the main wind farm site. The lands are in the townlands of Carrigduff, Annagannihy, Knocknagappul, Rahalisk, Oughtihery, Dooneens, Carriganish, Kilberrihert and Caherbaroul, Co. Cork.

Therefore, the key components for this assessment will be described throughout the EIAR as the following;

- The wind farm site (also referred to in this EIAR as ‘the Site’);
- The grid connection (UGC)
- The turbine delivery route (also referred to in this EIAR as ‘the TDR’);
- Biodiversity enhancement and management plan lands (also referred to in this EIAR as ‘the BEMP lands’).

The plans and particulars submitted with this application for consent are precise and provide specific dimensions for the turbine structures which incorporates a small range in dimensions. The turbine specifications will have a hub height range from 102.5m to 110.5m and a rotor diameter range from 149m to 155m with a tip height range from 179m to 185m. Each chapter of this EIAR has fully assessed all combinations within this range in turbine specification and the ultimate final turbine selection will fall within the parameters of this range. A detailed development description of this project is outlined in Section 3 below.



## 1.1 Requirement for EIAR

Under Section 172 of the Planning and Development Act (the Planning Act), as amended, a planning application for a development which comes within a class of development specified under Schedule 2 of Part 5 of the Planning and Development Regulations must be accompanied by an Environmental Impact Assessment Report. Accordingly, as the proposed development has more than 5 no. turbines and generating capacity of greater than 5MW this proposed development has been subject to impact assessment studies and an EIAR has been prepared in accordance with the Planning and Development Regulations.

Pursuant to Directive 2014/52/EU (the EIA Directive) of the European Parliament which has amended Directive 2011/92/EU this report constitutes an Environmental Impact Assessment Report (EIAR) and complies fully with the Directive.

As well as an EIAR, an Appropriate Assessment Screening and Natura Impact Statement has been prepared in compliance with Article 6 of the Habitats Directive. This report considers potential impacts on nearby nature conservation areas known as Special Protected Areas (SPAs) and Special Areas of Conservation (SACs).

## 1.2 EIAR Structure

The EIAR has been prepared using the “grouped format structure” as outlined in EPA guidance documents (EPA, 2002; EPA, 2003) and in line with the draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (2017). The format of this EIAR is designed to ensure that standard methods are used to describe all sections of the EIAR.

Using this structure there is a separate chapter for each topic, e.g. air quality and climate, biodiversity, hydrology. The description of the existing environment, the proposed development and the potential impacts, mitigation measures and residual impacts are grouped in the chapter. The grouped format makes it easy to investigate topics of interest and facilitates cross-reference to specialist studies.

The Main EIAR consists of the following chapters:

- Chapter 1 – Introduction
- Chapter 2 – Need for the Development and Alternatives Considered
- Chapter 3 – Description of the Proposed Development
- Chapter 4 – Policy
- Chapter 5 – EIA Scoping, Consultation and Key Issues
- Chapter 6 – Air Quality and Climate
- Chapter 7 – Noise and Vibration
- Chapter 8 – Biodiversity
- Chapter 9 – Land, Soils, Hydrogeology & Geology
- Chapter 10 – Hydrology and Water Quality
- Chapter 11 – Population, Human Health & Materiel Assets
- Chapter 12 – Shadow Flicker
- Chapter 13 – Traffic & Transportation
- Chapter 14 – Archaeology, Architectural and Cultural Heritage



- Chapter 15 – Landscape & Visual
- Chapter 16 – Telecommunications and Aviation
- Chapter 17 – Interactions of the Foregoing

The EIAR is structured as follows:

Volume 1 – Non-Technical Summary (NTS)

Volume 2 – Main EIAR

Volume 3 – Appendices to the Main EIAR

Volume 4 – Landscape and Visual Maps and Photomontages

### **1.3 Permission Period**

A ten-year consent is being requested for this development. That is, planning consent for the construction of the development would remain valid for ten years following the grant of permission. The applicant requests a grant of permission on the basis of a 35-year operational period from the date of commissioning of the wind farm. Both the grid connection and substation will form part of the national electricity networks, therefore these will be retained as permanent structures and will not be removed. Similarly the new and existing internal tracks and proposed amenity car park will remain and continue to be used for recreational purposes

### **1.4 Difficulties Encountered**

There were no difficulties encountered during the preparation of this EIAR.



## 2. SITE SELECTION AND ALTERNATIVES

### 2.1 Need for the Development

The proposed Ballinagree Wind Farm is necessary to produce renewable energy for the Irish national grid in order to transition Ireland to a low carbon economy. The proposed wind farm has an estimated Maximum Export Capacity (MEC) from 118MW to 132MW. The exact MEC will be dependent on the output power of the models available at procurement stage. The project will play a significant role in providing renewable electricity in the Republic of Ireland, accounting for approximately between 2.7% and 3% of the current installed wind energy capacity (Wind Energy Ireland, 2021).

At a strategic level, the need for the Project is supported by International, European, and National environmental and energy commitments and policies. In Chapter 4 of the EIAR, a detailed analysis of these commitments and policies are outlined.

The Irish Government published the updated Climate Action Plan in 2021 which sets ambitious actions to ensure our 2030 targets can be achieved. The current Taoiseach Michéal Martin on the launch of the Climate Action and Low Carbon Development (Amendment) Act (2021) remarked that:

*“The impact of our actions on the planet is undeniable. The science is undisputed. Climate change is happening. And we must act.” (Government of Ireland, 2020)*

The Climate Action Plan recognises that Ireland must make a significant increase in the current levels of renewable energy in the country.

It is estimated that the capacity of 118MW to 132MW of electricity from the proposed Ballinagree Wind Farm will result in the net displacement of between 132,414 and 148,125 tonnes of CO<sub>2</sub> per annum, which would arise from this quantum of fossil fuel generated electricity, as detailed in Chapter 6: Air and Climate.

The EU have rewritten the energy policy framework in the Clean Energy for all Europeans Package (2019). Member states must meet new commitments to improve energy efficiency and the take-up of renewables in their energy mix by 2030. For example, the new rules on the electricity market, which have been adopted, will make it easier for renewable energy to be integrated into the grid, encourage more inter-connections and cross-border trade, and ensure that the market provides reliable signals for future investment. This EU policy framework encourages energy security for all EU member states, emphasising a need for renewable energy and a move away from fossil fuels.

The proposed Ballinagree Wind Farm will assist in mitigating the effects of climate breakdown and help Ireland achieve its climate neutral economy no later than 2050, to be known as the ‘national climate objective’, as set out in the Climate Action and Low Carbon Development (Amendment) Act 2021. Furthermore, the Climate Action Plan 2021 seeks a total installation of up to 8 GW of onshore wind capacity by 2030. The Ballinagree Wind Farm has the potential to contribute to between 2.95% and 3.3% of the additional capacity (ca. 4 GW) required to achieve this 2030 national target.

The 2050 “Roadmap for a competitive low-carbon Europe” (European Commission, 2011) suggests that by 2050, the EU should cut greenhouse gas emissions to 80% below 1990 levels. This would require 40% emissions cuts by 2030 and 60% by 2040. This is in line with EU leaders’ commitment to reducing emissions by 80-95% by 2050. Ireland is likely to face equivalent mandatory targets from the EU.





Ireland has adopted these targets into the Climate Action Plan (2021) which includes a target to increase electricity generated from renewable sources to 80% by 2030. This will require doubling Ireland's production of electricity from renewable sources, which stood at 36.5% in 2019 (SEAI, 2020). The 2030 target sets out the pathway to the goal of net zero greenhouse gas emissions by 2050.

To achieve 80% renewable energy production by 2030, substantial new development will be required. The CAP sets out targets as follows which rely heavily on wind energy technology:

- Reduce CO<sub>2</sub> eq. emissions from the electricity sector by 62-81%;
- Deliver an early and complete phase-out of coal- and peat-fired electricity generation;
- Increase electricity generated from renewable sources to 80%, indicatively comprised of:
  - 5 GW of offshore wind energy
  - 1.5 to 2.5 GW of grid-scale solar energy
  - Up to 8 GW onshore wind energy.

The binding EU targets have been transposed into Irish National Policy in the 2021 Climate Action Plan which focuses a large amount of future electricity production on the wind energy sector. This demonstrates the significance of wind energy in the Irish energy context and highlights the need for the proposed Ballinagree Wind Farm in reaching both EU and national renewable energy targets.

Wind energy also becomes economically viable over its long lifetime, a report published by Baringa in January 2019 states that:

*“Our analysis indicates that the deployment of 4.1 GW of wind generation capacity in Ireland between 2000 and 2020 will result in a total net cost to consumers, over 20 years, of €0.1bn (€63 million to be exact), which equates to a cost of less than €1 per person per year.”* (Baringa, 2019).

## 2.2 Alternatives

This chapter of the EIAR includes a description of the reasonable alternatives studied by the developer which are relevant to the project and its specific characteristics and an indication of the main reasons for the option chosen, taking into account the environmental effects. The consideration of alternatives refers to alternative design, technology, location, size and scale. A ‘Do Nothing Scenario’ i.e., an outline of what is likely to happen to the environment should the Project not be implemented, is also included.

In 2014, Coillte's Renewable Energy Development Team (now Future Energy Ireland) undertook a detailed screening process, through Geographical Information Spatial software (GIS), using a number of criteria and stages to assess the potential of a large number of possible sites, on lands within its stewardship (c. 441,000 hectares), suitable to accommodate a wind energy development. The GIS database drew upon a wide array of key spatial datasets such as forestry data, ordnance survey land data, house location data, transport, existing wind energy and grid infrastructure data and environmental data such as ecological designations, landscape designations and wind energy strategy designations available at the time to identify sites. Five sites emerged from this selection process that Coillte's Renewable Energy Development Team (now Future Energy Ireland) and, where applicable, its co-development partners, are currently preparing separate applications for.



In 2017 Coillte's Renewable Energy Development Team once again examined the lands under its stewardship for candidate sites for wind energy development using the same site selection process as described above but this time reducing the required contiguous site area from 300 hectares to 50 hectares. Ballinagree was one of a further five sites that emerged from the selection process in 2017.

Ørsted regularly undertakes similar screening exercises and identified Ballinagree as a suitable site in a similar manner. The process of engaging with landowners in the area to establish interest in the project was commenced and that resulted in a number of landowners concluding option agreements and the Co-Development Agreement between Ørsted and Coillte to look at the Ballinagree site in further detail and establish the potential for a wind energy project at this location.

The design of the proposed Ballinagree Wind Farm was an iterative process which considered a range of alternative designs throughout the evolution of the project. The design iterations were influenced by potential environmental effects identified throughout the environmental assessment process, leading to the evolution of the developable area of the project and the establishment of the final design as proposed.

Alternative scales and densities were considered in the design of the project before settling on a maximum turbine height of 185m. Potential impacts of alternative densities, i.e., different numbers of turbines and different turbine heights were considered. Advancement in wind turbine technology was also considered as part of the design of the project.

The design option chosen to take forward for the proposed project was chosen as it strikes a balance between energy production capacity and avoidance of environmental sensitivities. The chosen option provides for the greatest amount of energy production while avoiding potential significant impacts on the receiving environment. The initial turbine layout consisting of 24 no. turbines was reduced to 20 by design iteration 3. Turbines were removed, amongst other reasons, due to noise and visual impacts.

A specified limited range of turbine specifications as follows is being applied and is assessed in the EIAR :

- Hub height range of 102.5 to 110.5m
- Rotor diameter range of 149m to 155m
- Tip height of 179m to 185m

When considering an appropriate substation to connect the proposed Ballinagree Wind Farm to the national grid, all grid infrastructure in the area of the wind farm site was examined. 3 no. high voltage substations were identified in proximity to the wind farm site with potential capacity to accommodate a 110kV connection. These substations include the Clashavoon 110/220kV Substation, located approximately 6km to the south, the Ballyvouskill 110/220kV substation, located approximately 8km to the west, and the Boggeragh Wind Farm 110kV Substation, located approximately 1km to the north. Seven options were considered including underground grid connections and overhead line loop in connections. The chosen option was an underground cable to the Clashavoon substation as it was considered to have the least potential impacts on the receiving environment.

This chapter also considered the use of imported construction material (stone) as opposed to site won material, i.e., excavation of stone on-site from borrow pits. Alternatives borrow pit locations within the site were also considered.

Alternative routes for turbine delivery were evaluated before settling on the proposed route, and alternative staging areas for the transfer of turbine blades from one transport vehicle to another during turbine delivery was also examined and is detailed in this chapter.



## 3. DESCRIPTION OF PROPOSED DEVELOPMENT

### 3.1 Proposed Development

This chapter of the Environmental Impact Assessment Report describes the existing site and the main components of the proposed project and provides details on the construction, operation and decommissioning of the wind farm in compliance with the EIA Directive.

In summary, the proposed project will consist of the following:

Permission for a period of 10 years, for development comprising the construction of a wind farm and related works within the townlands of Annagannihy, Aughinida, Ballynagree East, Ballynagree West, Bawnmore, Caherbaroul, Carrigagulla, Carrigduff, Clonavrick, Derryroe, Drishane More, Dromagh, Drominahilla, Dromskehy, Finnanfield, Inchamay South, Kilberrihert, Knocknagappul, Rahalisk and Tullig, Co. Cork.

The proposed project assessed in this Environmental Impact Assessment Report is comprised of the following key elements:

- The wind farm site (also referred to as ‘the Site’);
- The grid connection;
- The turbine delivery route (also referred to in this EIAR as ‘the TDR’);
- Biodiversity enhancement and management plan lands (also referred to as ‘the BEMP lands’).

The Site includes lands in the townlands of Annagannihy, Ballynagree East, Ballynagree West, Carrigagulla, Carrigduff, Finnanfield, Inchamay South and Knocknagappul, Co. Cork.

The grid connection which comprises a 110kV underground cable passes through the townlands of Clonavrick, Knocknagappul, Ballynagree East, Bawnmore, Ballynagree West, Derryroe, Rahalisk, Kilberrihert, Caherbaroul, Aughinida and is primarily located within the public road corridor.

Large components associated with the wind farm construction will be transported to the Site via the identified turbine delivery route. The turbine delivery route commences at the Port of Foynes and finishes at the wind farm site and includes the N69 towards Limerick, the M7, the N21, south along the N20 through the towns of Charleville and Buttevant before turning West onto the N72 at Mallow, the R583 towards Millstreet before turning onto the L2758 to the proposed wind farm site.

Biodiversity enhancement measures will be undertaken on lands proximate to the wind farm site. Four private landowners with a combined total of c. 304 ha of lands in the vicinity of the wind farm, but beyond 250m of any proposed turbine, have agreed to a long-term commitment to detailed land management measures designed to maintain and enhance local biodiversity. In addition, the Developer has undertaken to create wildlife corridors through strategic tree-felling between areas of open upland habitat in the vicinity of the proposed wind farm area. The lands are in the townlands of Carrigduff, Annagannihy, Knocknagappul, Rahalisk, Oughtihery, Dooneens, Carriganish, Kilberrihert and Caherbaroul, Co. Cork.



The proposed development for which planning permission is sought will constitute the provision of the following:

- Construction of 20 no. wind turbines with a blade tip height range from 179m to 185m, a hub height range from 102.5 to 110.5m and a rotor diameter range from 149m to 155m;
- Construction of turbine foundations and crane pad hardstanding areas including associated drainage infrastructure;
- Construction of new permanent site tracks and associated drainage infrastructure;
- Upgrading of existing tracks and associated drainage infrastructure;
- Upgrade of 2 no. existing forestry and agricultural access junctions for construction and operational access from 1) the Local Roads L2750-0/L1123-62 in the townlands of Finnanfield and Ballinagree East and 2) from the Local Road L7461-0 in the townland of Ballinagree West, Co. Cork;
- Upgrade of 2no. existing forestry access junctions for temporary construction access from the Local Road L7461-17 in the townland of Knocknagappul, Co. Cork;
- Use of 1 no. existing forestry and agricultural access junction for operational access only from the Local Road L-7461-44 in the townland of Knocknagappul, Co. Cork;
- Installation of new permanent watercourse and drain crossings and the reuse and upgrade of existing internal watercourse and drain crossings to include 1) the replacement of an existing stone bridge structure with a new clear span concrete bridge structure along the Local Road L-7461-0 in the townland of Ballinagree West and 2) a new clear span concrete bridge structure along a proposed new track in the townland of Carrigagulla, Co. Cork;
- 3 no. on site borrow pits and associated ancillary drainage within the townlands of Carrigagulla and Knocknagappul, Co. Cork;
- 2 no. Temporary construction site compounds and associated ancillary infrastructure including parking within the townlands of Ballinagree West and Carrigagulla, Co. Cork;
- Use of proposed wind farm access tracks and existing forestry and agricultural tracks as permanent recreational amenity trails for community use including the installation of associated signage and information boards and; the partial reinstatement and re-purposing of the proposed temporary construction compound as a permanent trail head car park and picnic area including associated landscaping within the townland of Ballinagree West;
- Construction of 1 no. permanent on-site 110kV electrical substation including control buildings, electrical plant and equipment, welfare facilities, carparking, water and wastewater holding tanks, security fencing, lightning protection and telecommunications masts, security cameras, external lighting and, all associated infrastructure within the townland of Ballinagree East, Co. Cork;
- Installation of medium voltage underground electrical and communication cabling connecting the wind turbines to the proposed on-site substation and associated ancillary works;
- Installation of permanent high voltage 110kV underground electrical and communication cabling between the proposed on-site substation within the townland of Ballinagree East to the boundary of the existing Clashavoon substation within the townland of Aughinida, Co. Cork. The cabling will be laid primarily within the public road in the townlands of Knocknagappul, Ballinagree East, Ballinagree West, Bawnmore, Clonavrick, Derryroe, Rahalisk, Kilberrihert, Caherbaroul and Aughinida, Co. Cork. Associated works including the installation of 15 no. pre-cast joint bays and communication chambers; and horizontal directional drilling under 4 no. watercourse crossings in the townlands of 1) Knocknagappul, 2) Knocknagappul and Rahalisk, 3) Rahalisk and Bawnmore and 4) Bawnmore and Clonavrick;
- Tree felling to accommodate the construction and operation of the proposed development;



- Erection of 2no. meteorological masts with a height of 100m above existing ground levels for the measuring of metrological conditions within the townlands of Ballinagree East and Carrigagulla, Co. Cork. A lightning rod will extend above the masts by 4 meters;
- Temporary accommodation works at 6 no. locations adjacent to the public roads to facilitate delivery of turbine components to site within the townlands of Dromagh, Dromskehy, Liscahane, Tullig, Drominahilla, Finnanfield and Ballinagree East, Co. Cork. These works will primarily relate to trimming of trees and hedgerows, temporary lowering of boundary walls, temporary removal of boundary walls, temporary ground reprofiling and installation of temporary stone hard standing;
- Installation of a temporary off-site staging area for turbine components within the curtilage of Drishane Castle which is a Recorded Protected Structure (00319) and National Monument (296), within the townland of Drishane More. The works will include removal of a masonry wall and installation of temporary stone hard standing area and associated access track and entrances to and from the public road R583;
- All related site works and ancillary development including landscaping and drainage;
- A 35 year operational life from the date of commissioning of the entire wind farm is being sought.

In addition to the above infrastructure for which consent from An Bord Pleanála (ABP) is being sought, the additional Turbine Delivery nodes described in Chapter 13 of this Environmental Impact Assessment Report and the Biodiversity Enhancement Lands have also been fully assessed.

### 3.2 Wind Turbines

The plans and particulars submitted with this application for consent are precise and provide specific dimensions for the turbine structures which incorporates a limited range in dimensions. The turbine specifications will have a hub height range of 102.5 to 110.5m and a rotor diameter range of 149m to 155m with a tip height of 179m to 185m. Each chapter of this EIAR has fully assessed this range and all combinations within this range and the ultimate final turbine selection will fall within the parameters of this range.

The exact make and model of the turbine will be dictated by a competitive tender process, but it will not exceed the maximum or minimum size envelope set out above.

### 3.3 Turbine Transport

Large components associated with the wind farm construction will be transported to site via the identified turbine delivery route. The proposed access route to site is as follows:

- Loads will depart the Port of Foynes and turn left onto the N69 towards Limerick;
- Loads will travel onto the M7 and turn onto the N21;
- Loads will turn onto the N20 and travel south through the towns of Charleville and Buttevant;
- Loads will turn west onto the N72 at Mallow and travel west;
- Loads will turn onto the R583 towards Millstreet;
- Loads will turn left onto the L2758 before entering Millstreet;



- Loads will travel South-East along the L2758 to the proposed wind farm site and will access the northern part of the site as Access point 2 and the southern part of the site at Access point 1.

Temporary accommodation works along this route will be required for the delivery of turbines to the site.

### 3.4 Connection to the National Grid.

The grid connection route (grid connection) will consist entirely of underground 110kV cable and will connect the on-site substation to the existing 110/220kV substation at Clashavoon, within the townland of Aughinida. The grid connection will be 11.4 km in length, with 9.4 km to be constructed within the existing road corridor with the remainder located along forestry tracks within private lands.

Connection works from the on site substation to Clashavoon substation will involve the installation of ducting, joint bays and ancillary infrastructure and the subsequent installation of cables. This will require delivery of plant and construction materials, followed by excavation, laying of cables and subsequent reinstatement of trenches and road surfaces.

### 3.5 Replant Lands.

Replacement replanting of forestry in Ireland is subject to license in compliance with the Forestry Act 2014 as amended. The consent for such replanting is covered by the Forestry Regulations 2017 (S.I. No. 191 of 2017). The total area required for replanting is 88 hectares. These lands will be licensed prior to commencement of construction on site. The clearfelling of trees in the State requires a felling licence. The associated afforestation of alternative lands equivalent in area to those lands being permanently clearfelled is also subject to licensing ('afforestation licensing').

The Forest Service of the Department of Agriculture, Food & the Marine is Ireland's national forest authority and is responsible for all forest licensing. In light of the foregoing and for the purposes of this project, the developer commits that the location of any replanting (alternative afforestation) associated with the project will be greater than 10 km from the wind farm site and also outside any potential pathways of connectivity with the proposed project. This will ensure that there is no potential cumulative impact associated with this replanting. In addition, the developer commits to not commencing the project until both felling and afforestation licences are in place and this ensures the afforested lands are identified, assessed and licensed appropriately by the relevant consenting authority.

### 3.6 Recreational Amenity Trail

Tracks that will be built and/or upgraded for the construction and operation of the wind farm will be made available as a recreational amenity during the operational phase of the project. 15.05 km of tracks shall be made available as recreational amenity trails for community use and shall include trail signage and way-markers.

The proposed amenity trails will not require any additional track construction and will make use of existing and proposed wind farm and forestry internal access tracks. There will be a car park with space for forty cars at the start of the trail. There will be a picnic area and trail signage also.



### 3.7 Construction

The construction sequence will be as follows, tree felling, upgrading of existing site tracks and the provision of new site tracks will precede all other activities. Drainage infrastructure will be constructed in parallel with the track construction. This will be followed by the construction of the turbine hardstanding areas and foundations. In parallel with these works the on-site electrical works i.e. the sub-station and internal cable network as well as off-site connection works to the national grid will be completed. It is expected that the construction phase, including civil, electrical and grid works, and turbine assembly will take between approximately 18 - 24 months.

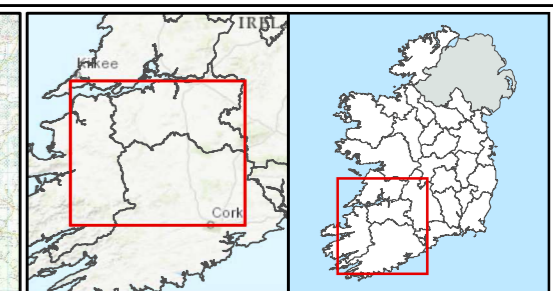
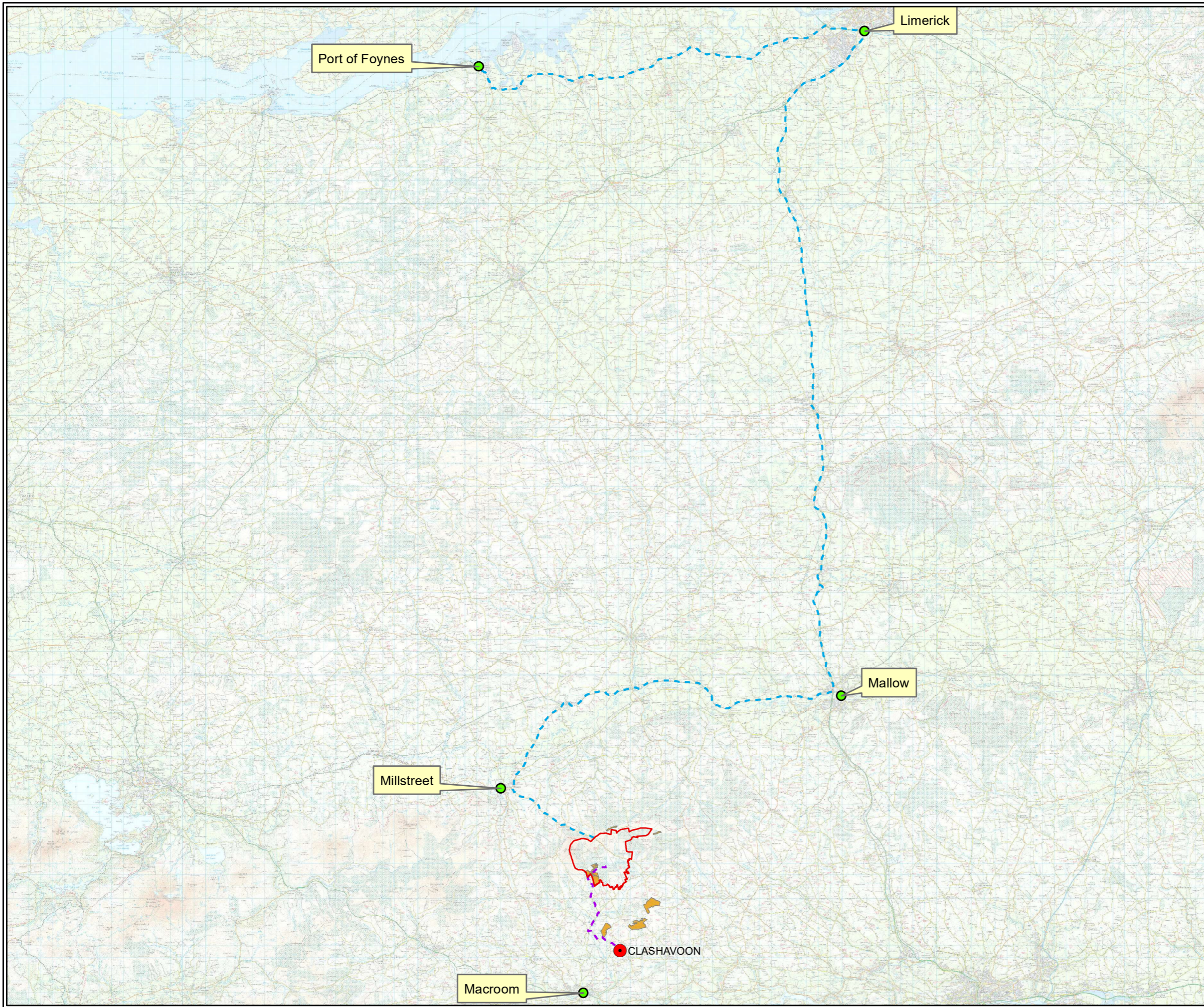
### 3.8 Operation, Maintenance and Decommissioning/Reinstatement

Permission is sought for a 35-year operation period commencing from full operational commissioning of the wind farm.

During the operation of the project some maintenance work may be required for the turbines and underground cabling. It will generally require maintenance and operations crews to tend to the site periodically throughout the lifetime of the project.

On decommissioning, cranes will disassemble the above ground turbine components which would be removed off site for recycling. All the major component parts are bolted together, so this is a relatively straightforward process. The foundations will be covered over and allowed to re-vegetate naturally. Leaving the turbine foundations in situ is considered a more environmentally sensible option as to remove the reinforced concrete associated with each turbine would result in environmental nuisances such as noise and vibration and dust. It is proposed that the internal site access tracks will be left in place.

Grid connection infrastructure including substations and ancillary electrical equipment shall form part of the national grid and will be left in situ.



**Legend**

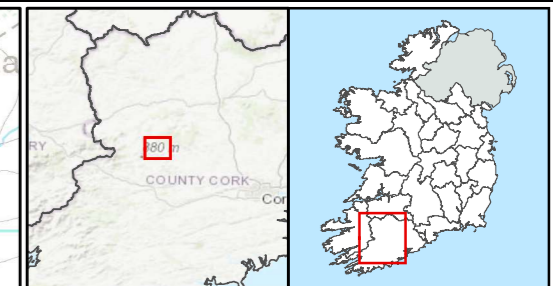
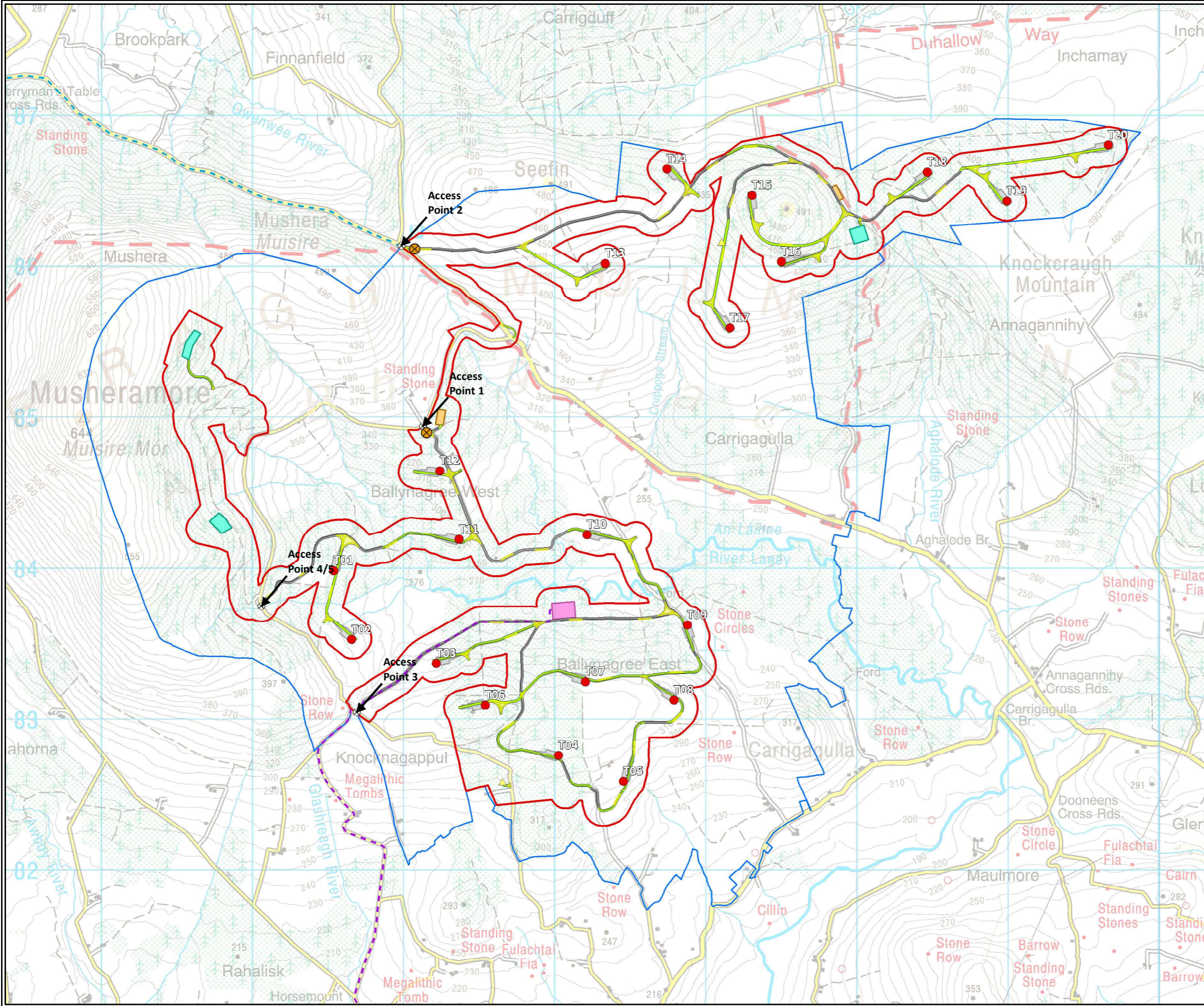
- Wind Farm Site
- Clashavoon Substation (110-220kV)
- Grid Connection
- Turbine Delivery Route
- BEMP Lands

<b>TITLE:</b>	Project Overview		
<b>PROJECT:</b>	Ballinagree Wind Farm		
<b>FIGURE NO:</b>	3.1		
<b>CLIENT:</b>	Coillte and Ørsted		
<b>SCALE:</b>	1:320000	<b>REVISION:</b>	0
<b>DATE:</b>	18/11/2021	<b>PAGE SIZE:</b>	A3

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**Legend**

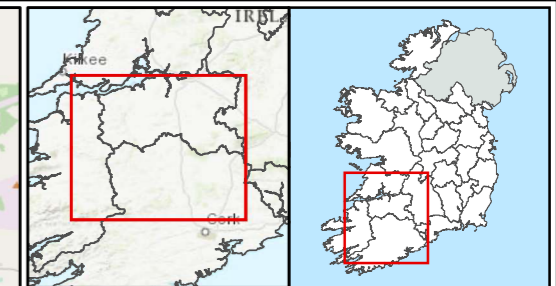
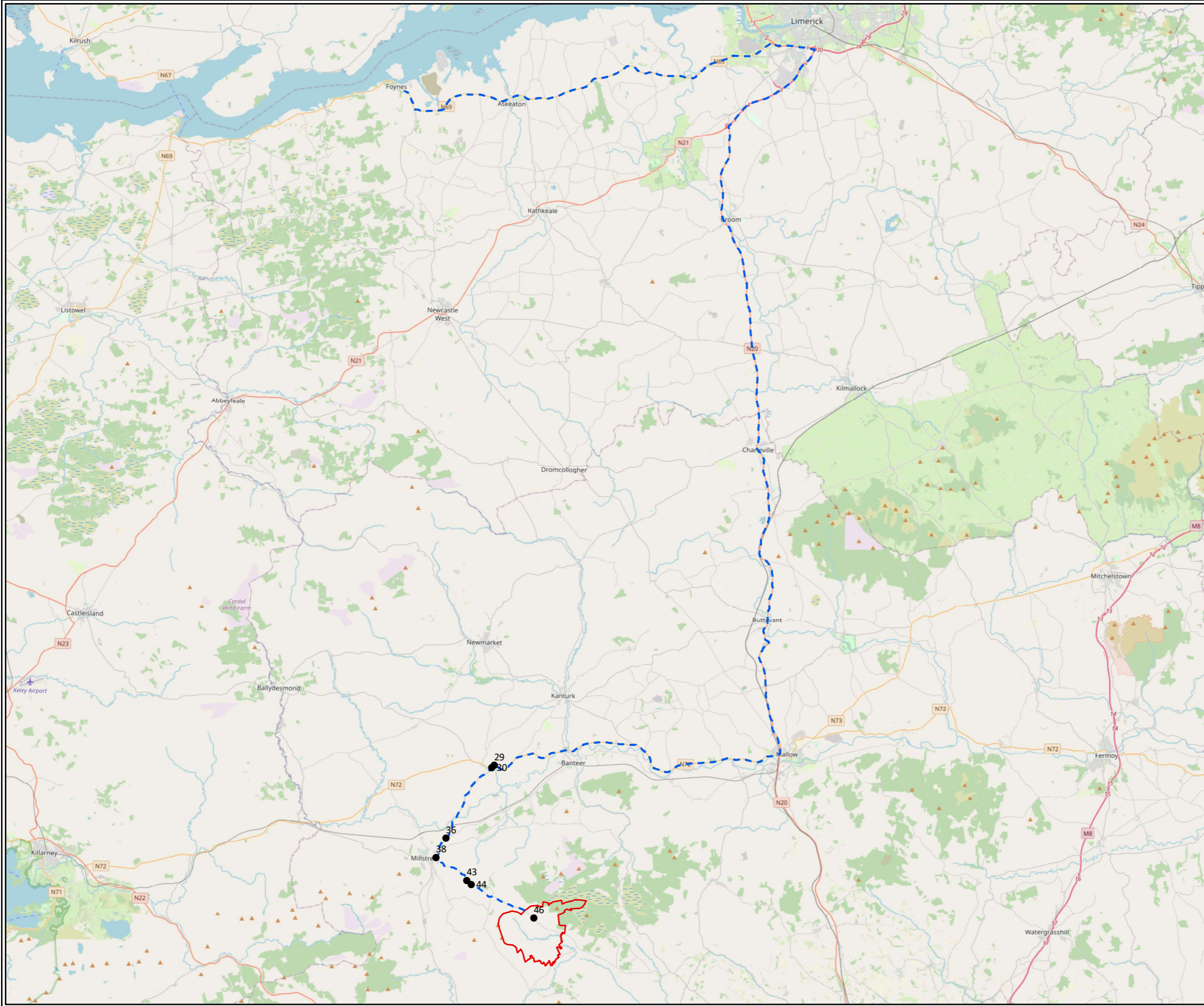
- Wind Farm Site
- Development Boundary
- Proposed Turbine Layout
- ▲ Met Mast
- ⊗ Wheel Wash
- ⊗ Access Points
- Turbine Delivery Route
- Grid Connection
- Construction Compound
- Substation Compound
- Proposed Borrow Pits
- Turbine Hardstanding Area
- Turning Heads and Passing Bays

**Access Tracks**

- Existing Track Upgrade
- New Access Track

<b>TITLE:</b>	Wind Farm Site Layout
<b>PROJECT:</b>	Ballinagree Wind Farm
<b>FIGURE NO:</b>	3.2
<b>CLIENT:</b>	Coillte and Ørsted
<b>SCALE:</b>	1:25000
<b>REVISION:</b>	0
<b>DATE:</b>	18/11/2021
<b>PAGE SIZE:</b>	A3





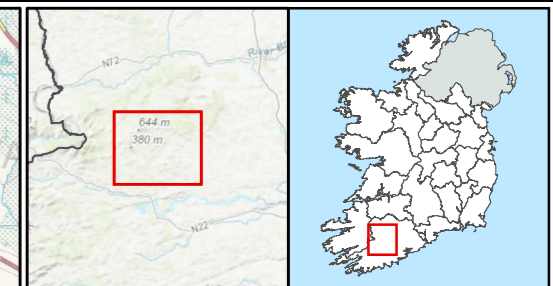
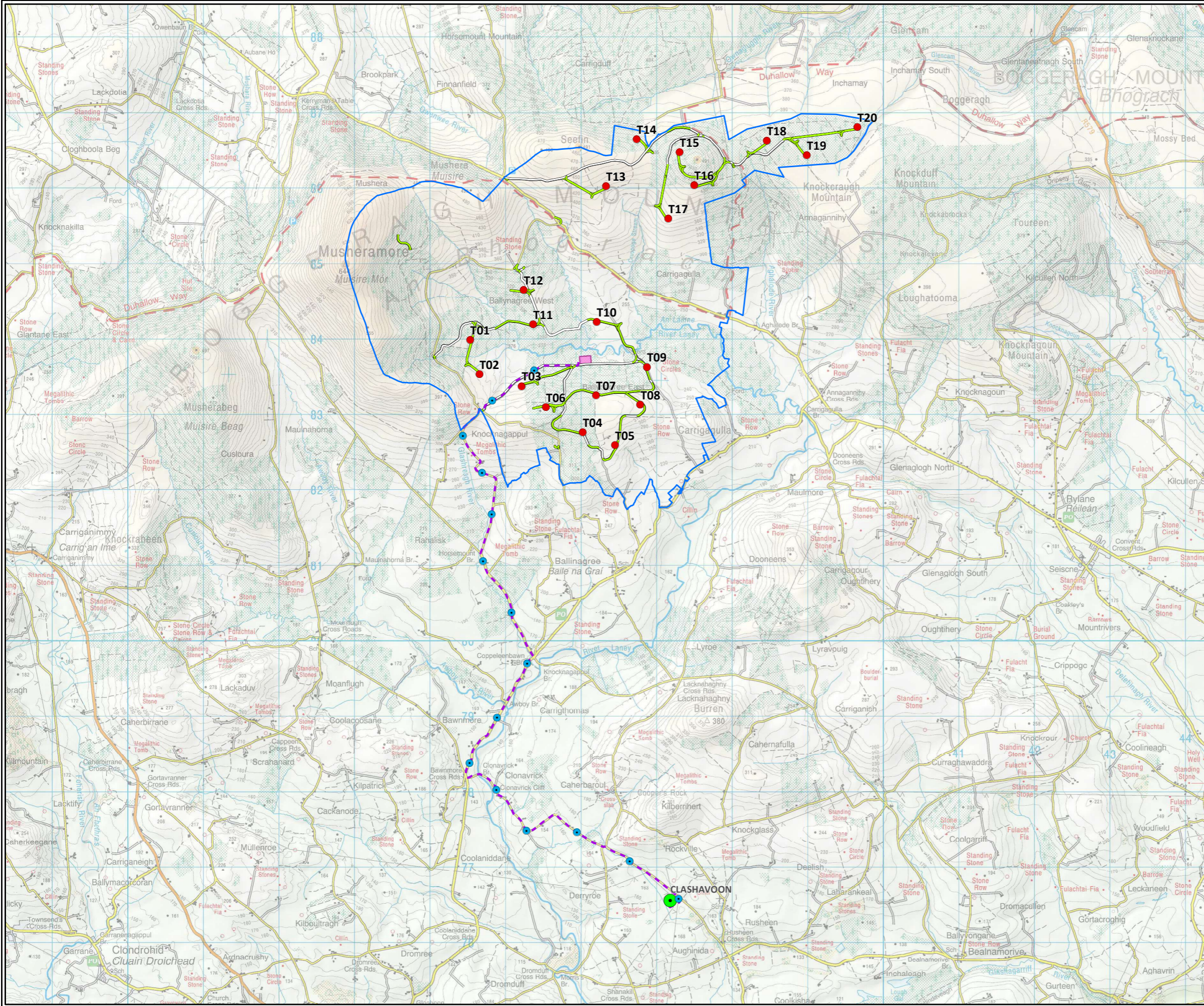
**Legend**

- Wind Farm Site
- Turbine Delivery Route
- TDR Nodes

<b>TITLE:</b>	
Turbine Delivery Route	
<b>PROJECT:</b>	
Ballinagree Wind Farm	
<b>FIGURE NO:</b> 3.3	
<b>CLIENT:</b> Coillte and Ørsted	
<b>SCALE:</b> 1:300000	<b>REVISION:</b> 0
<b>DATE:</b> 30/11/2021	<b>PAGE SIZE:</b> A3

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**Legend**

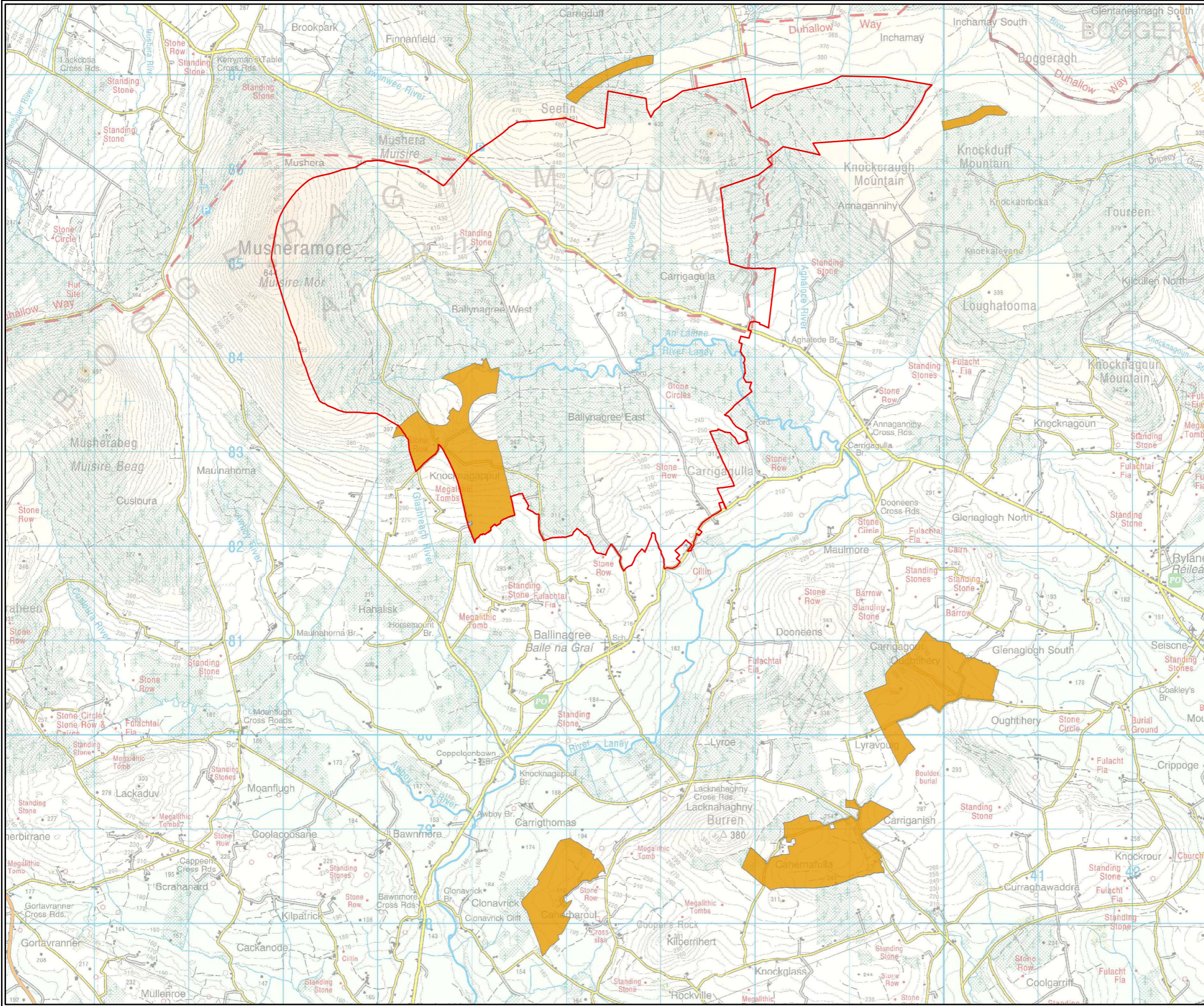
- Wind Farm Site
- Proposed Turbine Layout
- Joint Bays
- 220kV Substation
- Grid Connection
- Substation Compound

**Access Tracks:**

- Existing Track Upgrade
- New Access Track

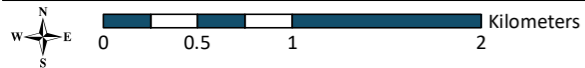
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<b>PROJECT:</b>		Ballinagree Wind Farm	
<b>FIGURE NO:</b>		3.4	
<b>CLIENT:</b>		Coillte and Ørsted	
<b>SCALE:</b>	1:50000	<b>REVISION:</b>	0
<b>DATE:</b>	19/11/2021	<b>PAGE SIZE:</b>	A3





- Legend**
- Wind Farm Site
  - BEMP Lands

<b>TITLE:</b>		BEMP Lands	
<b>PROJECT:</b>		Ballinagree Wind Farm	
<b>FIGURE NO:</b>		3.5	
<b>CLIENT:</b>		Coillte and Ørsted	
<b>SCALE:</b>	1:40000	<b>REVISION:</b>	0
<b>DATE:</b>	18/11/2021	<b>PAGE SIZE:</b>	A3





## 4. POLICY

This Chapter of the EIA outlines current EU, national, regional and where relevant local policy and legislation relating to the proposed Ballinagree Wind Farm.

Relevant international policies in relation to renewable energy and the need to prevent climate change include the United Nations Framework Convention on Climate Change and the Kyoto Protocol.

EU Directives and Policies include:

- 2030 Climate and Energy Framework
- A Roadmap for Moving to a Competitive Low Carbon Economy in 2050
- Recast Renewable Energy Directive (RED2)
- European Green Deal (2019)
- Clean Energy for all Europeans Package (2019)

Relevant National Policies considered include:

- Project Ireland 2040: The National Planning Framework
- Project Ireland 2040: National Development Plan 2018 – 2027
- Climate Action Plan (2021)
- Climate Action and Low Carbon Development Act 2015
- Ireland's Greenhouse Gas Emissions Projections 2018 – 2040
- Climate Action and Low Carbon Development (Amendment) Act 2021
- EU Governance Regulation and Ireland's National Energy and Climate Plan (NECP)

Regional and Local plans have also been considered including the Cork County Development Plan 2014 and Draft County Development Plan 2022 - 2028 which sets out the wind energy strategy for the county. Lands located within the wind farm development are identified as being 'open for consideration' for wind energy development.

The development of the Ballinagree Wind Farm is in support of national policy as set out above. The project supports the enhancement of the competitiveness of rural areas and facilitates the development and diversification of the rural economy by supporting the energy sector and increasing the share of renewables in Ireland's energy mix.

The project supports national targets of climate change mitigation and reduction in greenhouse gas emissions where significant focus has been set out in the recent Climate Action and Low Carbon Development (Amendment) Act 2021. The ambitious new programme for government is prioritising carbon neutrality and renewable energy generation. In light of this, it is important for the nation to rely on proven technologies such as on shore wind in order to meet the near-term objectives, as well as long-term objectives.



The proposed project promotes the generation of renewable energy at appropriate locations and supports the achievement of a low carbon economy by 2050. It is therefore considered that the proposed Ballinagree Wind Farm is in line with national policy and supports the achievement of national energy and sustainability targets.

The Cork County Development Plan (CDP) 2014 sets out the strategic framework for land use planning in the county. Chapter 9 of the CDP sets out the energy strategy for the County with an aim to:

*“Ensure that through sustainable development County Cork fulfils its optimum role in contributing to the diversity and security of energy supply and to harness the potential of the county to assist in meeting renewable energy targets.”*

The on-shore wind energy strategy designations of the Cork County Development Plan as set out in figure 9.3 of the CDP places the site within an area identified as ‘**Open to Consideration**’ for wind energy development.

*CDP Objective ED 3-5: **Open to Consideration** – “Commercial wind energy development is open to consideration in these areas where proposals can avoid adverse impacts on:*

- Residential amenity particularly in respect of noise, shadow flicker and visual impact;
- Urban areas and Metropolitan/Town Green Belts;
- Natura 2000 Sites (SPA and SAC), Natural Heritage Areas (NHA’s) or adjoining areas affecting their integrity.
- Architectural and archaeological heritage;
- Visual quality of the landscape and the degree to which impacts are highly visible over wider areas.”

The Draft Cork County Development Plan 2022-2028 was published in April 2021. Public consultation closed in July 2021 and the draft plan is expected to be adopted in 2022. Once adopted, this plan will replace the Cork County Development Plan 2014 as the main guiding planning policy for development within Cork County. The Draft Plan sets out policy and objectives relating to Energy and Climate Action.

The Draft Plan states that “if Ireland is to meet our renewable energy target then we need to double capacity nationally over the next ten years. On a pro rata basis, that could see capacity in Cork expand to 1,100MW”.

The Wind Energy Strategy contained in the Draft Plan sets out requirements for development proposals which includes a comprehensive assessment of the potential impacts of the proposed development on the receiving environment, requirement for EIA and AA, community engagement and participation, grid connection details, geology and ground conditions, drainage, landscape and visual impact assessment, natural heritage, built heritage, consideration of carbon emissions, noise, shadow flicker, electromagnetic interference, transport, cumulative assessment, waste and decommissioning.

The Ballinagree Wind Farm is located within an area considered to have capacity for wind energy development and is considered compatible with the existing land use on the site. The policy context for the site and surrounding area is considered favourable for the proposed Ballinagree Wind Farm, both from a national policy perspective with regard to renewable energy provision, and at a local level with respect to designations and the ability for the site to accommodate the proposed development.



## 5. EIA SCOPING, CONSULTATION AND KEY ISSUES

This section of the EIAR describes the EIA scoping process and the stakeholder consultation that was conducted throughout the development of the Ballinagree Wind Farm project. The purpose of the EIA scoping process is to identify the key points and issues which are likely to be important during the environmental impact assessment (EIA) and to eliminate those that are not. This is conducted by preparing a report detailing the proposed development and sending it to a list of consultees such as various governmental departments, non-governmental organisations, environmental bodies, interested parties and key stakeholders, including telecommunication companies and aviation authorities which operate in the area of the Ballinagree Wind Farm.

A scoping request was sent to relevant parties on the 2<sup>nd</sup> of July 2020. The scoping process proved beneficial to the identification of potential issues in relation to the proposed Ballinagree Wind Farm. Responses from the consultees identified a range of observations which have been taken into consideration in the preparation of the respective chapters of this EIAR.

Stakeholder consultation took place with a range of groups and individuals. A pre-planning meeting was held with Cork County Council planners in order to inform the authority of the project and to receive observations regarding design and potential environmental impacts. In light of this meeting consultation Cork County Council Heritage and Biodiversity Officers were consulted, as proposed by Cork County Council planners. Other consultation was also carried out with Inland Fisheries Ireland, National Parks and Wildlife Service, Irish Water, the Irish Aviation Authority and Telecommunications Operators. Concerns raised were addressed in the design and incorporated into the assessment.

Public events aimed at community engagement were scheduled for 2020 as design iterations of the project were developed, however, due to national COVID-19 restrictions, these events could not take place. Alternative means of public engagement were developed for the project including an online virtual exhibition where individuals could log on and view the presentation and provide feedback to the project team. This was supported by media presence to encourage attendance.

Project newsletters were produced in line with new project design iterations in order to provide local residents and stakeholders with up to date project information. This included five separate newsletters throughout the project development process. The newsletters include photographs, maps and photomontage images of the proposed wind farm

A dedicated project website was established in July 2019 in order to provide accessible information to the public regarding the proposed Ballinagree Wind Farm project. The information provided on the website includes project details, project timeline, latest project news, information on community engagement and community benefit, information on environmental protection and climate change and contact details in order for members of the public to get in touch with the project team.

Observations and issues that arose during the scoping and consultation process have informed the design, assessment and mitigation measures proposed as part of this project.



## 6. AIR AND CLIMATE

This section describes the existing air and climate environment of the proposed Ballinagree Wind Farm project as a whole. It examines the various elements of the construction, operational and decommissioning phases of the proposed project. Mitigation measures and the residual impacts after the proposed mitigation measures have been implemented are also described. A cumulative impacts assessment is also carried out.

### 6.1 Air

In order to protect our health, vegetation and ecosystems, EU Directives have set out air quality standards for Ireland and the other member states for a wide variety of pollutants and limits have been set for nitrogen dioxide, nitrogen monoxide, particulate matter, lead, carbon monoxide and benzene. There are no statutory limits for dust deposition. A review of existing air quality monitoring data undertaken by the Environmental Protection Agency was carried out and nearby air quality data was used to characterise the existing environment.

To predict potential air and climate impacts the Ballinagree Wind Farm construction site was assessed and categorised according to Transport Infrastructure Ireland criteria which categorises traffic movements and potential dust deposition as a result of the construction traffic of a project. The principal source of potential air emissions will occur during the construction of the wind farm and placement of the grid connection route which will produce dust. Dust emissions arise when particulate matter becomes airborne making it available to be carried downwind from the source and may cause dust soiling in the surrounding area. Following the implementation of mitigation measures, the Ballinagree Wind Farm may result in slight to moderate residual impacts arising from fugitive dust emissions during particular construction activities. These will be localised in nature and as they will be associated with particular elements of the construction phase, they will be temporary in nature and will not result in any permanent residual impacts.

Traffic emissions were not taken into account when predicting air quality for the Ballinagree Wind Farm as traffic increase numbers will fall below the screening criteria set out in guidance, on which the Transport Infrastructure Ireland guidance is based. Plant and machinery such as generators, excavators etc. will be required at various stages of the construction works. These will be relatively small units which will be operated on an intermittent basis. Although there will be an emission from these units, given their scale and the length of operation time, the impacts of emissions from these units will be imperceptible.

Once the proposed Ballinagree Wind Farm is constructed there will be no significant direct emissions to atmosphere. In terms of decommissioning, traffic emissions and dust also would be significantly less than the construction phase and would potentially result in a slight temporary impact. There will also be emissions from machinery at the wind farm, however, this is not likely to result in significant impacts.

In terms of cumulative impacts, negative cumulative impacts in relation to air quality would only occur if a large development was located in the vicinity of the site and was in the process of construction at the same time. There are a large number of existing and approved projects and developments in the planning system within the vicinity of the site including solar farms, wind farms and battery storage facilities. Should any of these projects be constructed at the same time as Ballinagree Wind Farm the cumulative impacts are considered to be short term and of slight significance.

There are a number of wind farms within 20km of the proposed development, the closest of these is Boggerragh Wind Farm, currently operational, which is located 860m at its closest extent to the proposed development.





The next nearest is Carraigcannon Wind Farm, which is located some 4km to the north. These facilities are operational and will have a slight short term cumulative effect on air emissions as a result of the low levels of maintenance traffic associated with their operational phases.

Cumulative impacts may arise if the construction period of other projects occurs simultaneously with the construction of the proposed wind farm and grid connection route. However, provided the mitigation measures are implemented, there will be no significant cumulative effects on air quality

Mitigation measures have been outlined for dust during the construction phase of the project. A Construction Environmental Management Plan (CEMP) has been prepared and is included in Appendix 3.1. of the EIAR. The CEMP sets out the key construction and environmental management measures associated with the proposed project. The developer in association with the contractor will be required to implement the dust control plan contained in the CEMP. As the operation of the project will have positive impacts on air quality, mitigation measures for the operational phase are considered unnecessary. Measures for the decommissioning phase will be similar to those laid out for the construction phase.

## 6.2 Climate

The Irish government has recently published the Climate Action Plan 2021 (CAP) which sets out a plan of action to address climate change and sets decarbonisation targets. In terms of renewable energy, electricity generated from renewable energy will increase to 80% by 2030, with up to 8GW of onshore wind capacity and at least 5GW of installed offshore wind capacity.

A desk-top study assessment was undertaken of available climatic information to characterise the existing environment. There is the potential for greenhouse gas emissions to the atmosphere during the construction phase of the wind farm such as those arising from construction vehicles, the use of on-site generators, pumps etc. The potential climatic impacts arising from these emissions were assessed in terms of carbon losses and savings as a result of the proposed construction and operation of the wind farm, by using a carbon calculator provided by the Scottish Government for wind farm development on peat. The wind farm will, during construction, result in the release of carbon dioxide. These are due to the manufacture, construction and decommissioning of the turbines, losses due to reduced carbon fixing potential, losses from soil organic matter and losses due to felling of forestry. However, payback time is estimated at between 1.6 and 1.7 years. It is estimated that the Ballinagree Wind Farm will result in the net displacement of between 132,414 and 148,125 tonnes of carbon dioxide annually. From an operational perspective, the Ballinagree Wind Farm will displace the emission of carbon dioxide from other less clean forms of energy generation and will assist Ireland in meeting its renewable energy targets and obligations.

In terms of climate, the proposed Ballinagree Wind Farm will act cumulatively with other renewable energy projects in reducing carbon dioxide emissions by displacing fossil fuel in the production of electricity, resulting in a slight-moderate positive impact on climate. There will be residual positive impacts from the operation of the proposed Ballinagree Wind Farm in terms of the displacement of fossil fuel energy generation with renewable energy.



## 7. NOISE AND VIBRATION

The proposed Ballinagree Wind Farm is located within a rural environment, in an area comprising forestry and agricultural activities.

The assessment has considered the whole range of proposed turbine dimensions, including minimum and maximum tip heights, hub heights and rotor diameters.

Baseline noise monitoring has been carried out at sixteen receptor locations around the proposed windfarm to establish the existing levels of background noise in the vicinity of the site and enable noise criteria for the site to be derived. The standard approach to derive noise limits is to carry out baseline measurements at several properties around the proposed site. Noise limits are then derived for the properties at these locations based on the results of the measurements. As it is not usually possible to carry out measurements at every property, properties near to the measurement property are then assigned the same limits as the measurement property. The operational noise impacts are assessed with reference to the UK Institute of Acoustics document -A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind turbine Noise.

The chosen noise monitoring locations are representative of the different noise environments in the vicinity of the proposed Ballinagree windfarm, in addition to representing the closest dwellings to the proposed windfarm. Baseline noise monitoring was used to derive appropriate noise limits based on Best Practice Approach currently used by the acoustics industry including, ETSU-R-97, The Assessment and Rating of Noise from Wind Farms (1996), the Institute of Acoustics' A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise, (May 2013) and the Department of the Environment, Heritage and Local Government Wind Energy Development Guidelines 2006, . Operational noise from the proposed turbines is predicted to meet the derived daytime and night time noise limits at all occupied dwellings and at all locations where planning permission exists for dwellings not yet constructed.. This assessment has assessed the range of proposed wind turbine heights. Noise from the proposed Ballinagree windfarm and substation meets the daytime and night time noise limits. Cumulative noise from the proposed windfarm, substation and adjacent existing and proposed windfarms has also been assessed. When cumulative noise is considered, noise mitigation is required to reduce noise from the proposed development at one property. This mitigation is provided by limiting noise from two of the turbines when wind speeds operate at 7m/s or 8m/s, using noise reduced turbines.

Potential noise and vibration impacts during the construction, operational and decommissioning phases were assessed.

The nearest noise sensitive locations from the on-site construction works are sufficiently distant that vibration will not be perceivable by residents at their dwellings and building damage will not occur from construction incurred vibration. As such, construction vibration are not considered further.

Vibration from the turbines is too low to be perceived at neighbouring residential dwellings. Vibration levels will also be significantly below levels that would result in damage to the nearest buildings (including farm buildings). Therefore, operational vibration has been scoped out.

For construction noise, mitigation measures have been proposed and therefore effects from noise are calculated to be below the relevant noise guideline limits at 22 noise sensitive locations. Similarly, effects from noise during the decommissioning phase are calculated to be below the relevant noise guideline limits. There is potential for short term noise impacts during the grid connection works and occasional night time deliveries of turbine parts, but these will be for a short period of time.



Where these works take place at elevated noise levels, a temporary barrier will be used to reduce noise levels and by limiting the number of machinery operating simultaneously.

Operational noise from the proposed windfarm is expected to lead to a long term impact of slight to moderate significance on dwellings within the 35 dB  $L_{A90}$  study area and a moderate significance of impact for properties closest to the wind farm and, as stated above, is predicted to meet the derived daytime and night time noise limits. This is based on curtailment of operation of the wind turbines. Operational noise from the proposed substation is very low and is not considered to be significant at the nearest noise sensitive locations.



## 8. BIODIVERSITY

### 8A Terrestrial Biodiversity

Chapter 8A of the EIAR describes the flora and terrestrial fauna in the receiving environment and assesses the potential impacts of the project upon terrestrial ecology. Detailed terrestrial biodiversity field and desktop studies were undertaken from 2017 to 2021 by Ecology Ireland Wildlife Consultants Ltd. The field surveys undertaken included intensive multi-season surveys of birds and bats and specialist botanical and habitat mapping studies. The main study area for the project encompassed the application site and surrounding lands. Dedicated surveys and assessments of the grid connection and turbine delivery routes were also carried out.

From the outset an iterative process of constraints led design was employed for the proposed windfarm whereby input from the ecological team was utilised at an early design stage in identifying the constraints and designing the site layout to take account of these constraints. The siting of the turbines and associated infrastructure was informed by the environmental constraints throughout the design process.

The main terrestrial study area and the grid connection route lie outside any designated Natura 2000 site although the study area directly adjoins Mullaghanish to Musheramore Mts. SPA (004162). The nearest proposed turbine location to the SPA is 0.5km from the site boundary. The Boggeragh Mountains NHA (002447) overlaps the northern part of the wind farm study area and part of the underground cabling will be along the local road which is located within the NHA. However, as this work will involve the burying of cable and associated resurfacing within the existing road corridor there will be no direct impact upon the habitats for which the NHA is designated. The Natura Impact Statement (NIS) which accompanies the planning application contains information which the competent authority, may consider in making its own complete, precise and definitive findings and conclusions and upon which it is capable of determining that all reasonable scientific doubt has been removed as to the effects of the proposed project on the integrity of the relevant European sites.

The dominant habitats present within the proposed development works footprint are largely modified habitats; including mature, semi-mature and young 1<sup>st</sup> and 2<sup>nd</sup> rotation commercial conifer plantation WD4, improved agricultural grassland GA1, semi-natural to semi-improved wet grassland GS4 and buildings and artificial surfaces BL3 (forestry tracks, local roads). Modified habitats such as commercial conifer plantation WD4, improved agricultural grassland GA1 and buildings and artificial surfaces BL3 are considered of low ecological value. No botanical species protected under the Flora Protection Order FPO as amended (2015), listed in Annex II or IV of the EU Habitats Directive (92/43/EEC), or Red-listed in the Irish Red Data Books were recorded within the site boundary. No Third-Schedule Invasive Plant species were recorded within the proposed development footprint. Taking the scale of the study area into account the dominant habitats included in the proposed development works footprint (*e.g.* conifer plantation WD4, improved agricultural grassland GA1 and semi improved/semi-natural grassland GS4) support limited flora/diversity overall.

A range of specialist bird surveys were undertaken from 2017-2021. Breeding and Wintering Bird surveys were undertaken including Vantage Point (VP) surveys which were carried out to record flightlines of key bird species. Annex I bird species observed to occur within the study area from time to time were, Hen Harrier, Golden Plover, Peregrine Falcon and Merlin. A number of other Annex I avian species have been recorded on, or in the vicinity of the study area on a 'once-off' basis during the intensive field surveys including Marsh Harrier, Red Kite and White-tailed Sea Eagle. Hen Harriers were recorded occasionally, however they were typically observed within the study area for 1% (or less) of the total period of observation in each survey season.



No courtship/display behaviour of any Annex I bird species was noted during the VP surveys and no Hen Harrier nesting activity took place at the study area or within 2km of the study area boundary in any of the survey years. Activity was relatively broadly distributed at the site, with no areas of high or focused activity noted. General bird surveys established that the study area is used by a diversity of breeding and wintering species typical of the range of habitats present at the terrestrial biodiversity study area (i.e., conifer plantation, bog/heath, rough grassland and improved agricultural grassland).

The study area was found to have relatively low non-volant mammal abundance, reflecting the dominance of highly modified habitats at the site (i.e., conifer plantation and improved agricultural grassland). The non-volant mammal assemblage is dominated by common and widespread species such as Fox and Irish Hare and no breeding sites of any protected non-volant mammal species was found within 50m of the proposed turbine locations.

Active and Passive bat detector surveys, roost checks and emergence surveys were undertaken to record the bat activity in the area. General bat activity encountered on the active surveys was relatively low, with occasional clusters of calling bats. Common Pipistrelle was by far the most frequently recorded species during the active surveys with much fewer and more patchily distributed registrations of Soprano Pipistrelle and Leisler's Bat. There were two records of calling *Myotis* sp. made from close to the River Laney during the active surveys. Common Pipistrelle was also the species most frequently recorded by passive detectors deployed at the site from 2017-2020. The site generally lacks suitable structures or natural bat roosting features and primarily represents a foraging habitat. A total of eight bat species were recorded during the passive detector surveys (possibly nine as Whiskered Bats and Brandt's Bats are indistinguishable through ultrasonic detection). The level of activity recorded at the site during the passive surveys varied according to season, location and species. Overall activity was highest in the early-autumn survey period at a time when that year's young bats would be on the wing, and bats are foraging in order to prepare for winter hibernation.

Dedicated Marsh Fritillary surveys were carried out and larval webs were confirmed at two locations. Neither area is within or directly adjoining the construction footprint of the proposed development. Three additional casual Marsh Fritillary observations (two of these of adult butterflies) were noted from other terrestrial biodiversity surveys carried out in the study area. None of the 'other taxa' recorded at the site (apart from Common Lizard and Common Frog) are currently listed on the Irish Wildlife Acts (1976 - 2012 as amended).

A Biodiversity Enhancement Management Plan (BEMP) has been prepared to outline a set of land management prescriptions (commitments and monitoring) as part of the proposed Ballinagree Wind Farm Project. The BEMP is not designed to mitigate or address particular potential impacts associated with the construction, operation or decommissioning of the proposed wind farm. It is instead a commitment provided to yield a lasting biodiversity benefit to the area around Ballinagree. Four private landowners with a combined total of c. 304 ha of lands in the vicinity of the wind farm, but beyond 250m of any proposed turbine, have agreed to a long-term commitment to detailed land management measures designed to maintain and enhance local biodiversity. In addition, Coillte, a 50% stakeholder in Future Energy Ireland, has undertaken to create wildlife corridors through strategic tree-felling between areas of upland habitat in the vicinity of the proposed wind farm area. The measures include those designed to protect watercourses, prevent overgrazing and to clear invasive and site inappropriate plants. Higher value habitats will be actively managed to maintain and improve their value and lower value habitats will see specific interventions designed to improve their attractiveness for a wide range of species. Inputs (e.g., fertiliser, herbicide) will be controlled and appropriate planting will increase the available feeding, roosting and nesting cover for wildlife. Certain measures (e.g., control of stocking density) will be universal across the management lands. Other measures (e.g., planting of wildbird cover and native deciduous woodland) will be entirely site specific. The measures proposed take into account the habitats present and their current condition and importance in the local landscape. The BEMP programme represents a significant commitment to enhance the biodiversity value and ecological connectivity across a large land bank.

The programme will run for the lifetime of the windfarm and many of the proposed features (e.g., tree and hedgerow planting) will have a longer-lasting biodiversity benefit to the lands included in this plan.



The terrestrial biodiversity assessment considers the potential for construction, operational and decommissioning phase impacts upon the designated nature conservation sites and the habitats and species present in the receiving environment.

The Ballinagree wind farm footprint is dominated by conifer plantation (WD4) of mixed ages and rotations, as well as improved agricultural grassland (GA1), with 16 of the 20 proposed turbines and associated access tracks being located in these habitats and with up to 11.8km of existing access tracks (buildings and artificial surfaces BL3) being utilized and upgraded at the site. The grid access cable will be undergrounded from the proposed new on-site 110kV Ballinagree substation to the Clashavoon substation via access tracks and public roads and will involve relatively little habitat disturbance or permanent habitat loss. With the application of environmental monitoring and management and appropriate mitigation the laying of the cable route has very little potential to negatively impact upon the habitats and species occurring along the cable route. The works at the Points of Interest (POIs) along the turbine delivery route have been assessed and the habitats present are not particularly sensitive. The required works are relatively minor in nature, highly localised, and largely temporary in nature.

All turbines were sited based on avoidance of high sensitivity habitats. A minimum 75m buffer was applied from natural waterbodies to turbines with a minimum 50m buffer for all other project infrastructure (except at stream crossing points, works associated with the improvement to the access track and the undergrounding of the cable route), where wind turbine foundation excavations will not extend to within 50m of a watercourse. The construction of the proposed project will be implemented in accordance with the planning phase Construction Environmental Management Plan (CEMP) for the proposed project to ensure environmental protection of the site in accordance with best practice controls. An appropriately qualified and experienced Ecological/Environmental Clerk of Works (ECoW) will be appointed to monitor the day-to-day construction activity and implementation of the environmental and ecological mitigation measures. Measures to mitigate potential construction impacts on fauna include timing the tree-felling and removal of mature vegetation to outside of the bird breeding season (March 1<sup>st</sup> – August 31<sup>st</sup>). There will be pre-construction checks of the development footprint for protected species and extensive construction and operational phase monitoring of terrestrial biodiversity.

The monitoring and mitigation commitments provided in Chapter 8A (and CEMP) will be effective in ensuring that the residual impacts of the proposed development will likely be **slight negative (local) in the temporary to short-term** upon the terrestrial habitats and species that occur in the receiving environment. With the implementation of the BEMP there will be a predictable local gain for biodiversity in the area. The commitments provided are designed to yield a number of positive outcomes for species and habitats in the area, throughout the lifetime of the wind farm and into the future. The residual terrestrial biodiversity impacts are therefore considered to be likely **significant positive at the local level** in the long-term.

## 8B Aquatic Biodiversity

There were two European sites with downstream hydrological connectivity to the proposed Ballinagree wind farm project, namely Mullaghanish to Musheramore Mountains Special Protected Area (site code: 004162) and Blackwater River Special Area of Conservation (002170). The Mullaghanish to Musheramore Mountains Special Protected Area is designated for the non-aquatic qualifying interest hen harrier. The Blackwater River is designated for a number of aquatic qualifying interests including the following: freshwater pearl mussel, white-clawed crayfish, sea, brook and river lamprey, otter, Atlantic salmon and a number of habitat types.



The River Laney is the most significant watercourse draining the wind farm site. High water quality status was recorded along this river and it is designated 'not at risk'. The Awboy River is a tributary to the Laney and has a high water quality status. The Glen River drains to the north of the site and adjoins the River Blackwater. Water quality is recorded as high status along this river.

### Potential Impacts

During the construction phase tree felling will take place. Due to the proximity of the proposed tree felling activities to hydrological connections, potential impacts to aquatic ecology, in the absence of mitigation, are assessed as being likely significant negative, short-term and at the local scale. Potential effects from excavations (earthworks) are considered significant negative, short-term and in the local context and in the context of European Sites, in the absence of mitigation. Other construction activities with potential to impact on aquatic ecology include installation and upgrade of access tracks, installation of met masts, installation of site drainage, installation of the grid connection and accommodation works associated with the turbine delivery route.

Potential operational phase impacts on aquatic ecology are considered likely slight negative, short-term and in the local context, in the absence of mitigation. The installation of a fish passable culvert at a watercourse crossing will result in a likely slight positive, long-term impact in the local context. Decommissioning activities of the Ballinagree wind farm project will take place in a similar fashion to the construction phase. Potential impacts will be similar to the construction phase but on a reduced scale. The decommissioning phase poses similar risks of potential effects as the construction phase.

### Mitigation Measures

Construction phase mitigation measures for aquatic ecology predominantly involve the preservation of water quality and relate to the measures set out in Chapter 10 of the Environmental Impact Assessment Report: Hydrology and Water Quality.

For tree felling, a machinery exclusion zone of 10m will apply from water courses. Check dams/silt fences will be required within the on-site drainage channels which provide potential surface water pathways to receiving watercourses. Drains and silt traps will be maintained throughout all felling works, ensuring that they are clear of sediment build-up and are not severely eroded. Brush mats will be used to support vehicles on soft ground, reducing peat and mineral soils erosion and avoiding the formation of rutted areas, in which surface water ponding can occur. Brush mat renewal will take place when they become heavily used and worn. Provision will be made for brush mats along all off-road routes, to protect the soil from compaction and rutting. Furthermore, the Department of Agriculture, Food and the Marine's 'Standards for Felling and Reforestation' (2019) and 'Forestry Standards Manual' (2015) will be observed.

All track widening will be undertaken using clean uncrushable stone with a minimum of fines, to reduce the risk of suspended solid releases to receiving watercourses. It is proposed to construct two single span bridges, comprising the replacement of an existing bridge over a tributary of the River Laney and the construction of a new bridge over the River Laney. It is proposed to install 3 no. pre-cast concrete box culverts along proposed access tracks. Forestry drains will be crossed using 450mm diameter pipes. Where cross drains are to be provided to convey the drainage across the track, the minimum sizes of these cross drains are 300mm diameter pipes. Silt Protection Controls are proposed at the location of the drain crossings.

Horizontal directional drilling will be used at four points along the grid route to install the grid route cable below existing streams. This will avoid instream works and serve to protect sensitive aquatic ecological receptors.



As an extra precaution, drilling will only occur during a dry period between July to September. A pre-construction otter survey will be undertaken in the vicinity of each drilling location.

Operational mitigation for protection of aquatic ecology relates to the proposed surface water drainage and is set out in Chapter 10 of this Environmental Impact Assessment Report. During the decommissioning phase, similar mitigation measures will be used as set out for the construction phase.

Through the implementation of the proposed mitigation measures outlined above and in Chapter 10 of this Environmental Impact Assessment Report, residual impacts to water-dependent species and habitats are considered to be **non-significant, short-term and in the local context** (i.e. sub-catchment scale). Residual impacts to the aquatic qualifying interests (including freshwater pearl mussel) of the Blackwater River Special Area of Conservation (002170) are considered to be **not significant negative, short-term and in context of the European site**.





## 9. LAND, SOIL, HYDROGEOLOGY AND GEOLOGY

### Existing Environment

The Quaternary Geology underlying the proposed Ballinagree Wind Farm, found on Geological Survey of Ireland mapping, comprises of Till derived from Devonian sandstones (TDSs); Bedrock outcrop or sub-crop (Rck); Blanket peat (BktPt) and Alluvium (A). The majority of the proposed grid connection route is underlain by Till derived from Devonian Sandstones with limited areas of bedrock sub-crop or outcrop and alluvium indicated along the proposed grid connection route.

The Groundwater Vulnerability within the proposed Ballinagree Wind Farm site boundary is classified by the GSI as ranging from 'High' to 'Extreme' with areas of exposed bedrock (X – Rock Near Surface) also present within the proposed development site. Based on the GSI aquifer vulnerability mapping, overburden deposits are generally between 3 and 10m deep in the central portion of the site; generally, 3 to 5m deep in the north and east of the site; and <3m deep in the west south and a portion of the north of the site.

Based on a review of the GSI Groundwater Wells and Springs database there are 6 No. Groundwater Wells recorded (500 m to 1 km accuracy) within 1km of the proposed development site.

According to the GSI datasets, there are no karst features recorded within the proposed site.

The GSI Online Irish Geological Heritage database indicates that the proposed development area is not located in an area of specific geological heritage interest. The nearest site of significant geological heritage features to the study area is located approximately 3km to the east of the proposed development which is the Boggeragh Mountains NHA.

The GSI Online Minerals Database accessed via the Public Data Viewer shows a number of active and historic quarries and mineral occurrences surrounding the study area. These consist of sand and gravel quarries and recorded mineral occurrences none of which are located within the site boundary. The nearest quarry is identified as Bweeng Quarry located in Mallow, Co. Cork. This is a Sand & Gravel quarry to the north-east of the Ballinagree site.

Intrusive investigations were undertaken at the proposed borrow pit locations, at selected proposed turbine locations, along the proposed access tracks and at each of the proposed borrow pit locations. The purpose of the intrusive works was to confirm the geological succession underlying the site. The site investigations comprised the excavation of 64 no. trial pits to a maximum depth of 4.8m BGL and 6 no. rotary boreholes to a maximum depth of 15m BGL.

Peat deposits were generally noted to be limited to the northern area of the site and thicknesses ranged between 0 – 3m. Peaty topsoil was present in areas of the southern area of the site.

No evidence of slope instability was observed at the site and there are no historical records of landslide activity within or close to the site on the GSI database. There are no historical records of landslide activity within or close to the site, according to the GSI database.



## Potential Impacts

During construction, potential impacts include soil erosion, soil compaction, soil contamination, ground water pollution and slope failures. These potential impacts can occur as a result of tree felling, earthworks and excavation of borrow pits. The proposed development and proposed infrastructure locations are located within areas of 'Low' to 'Moderately High' landslide susceptibility, according to the Geological Survey Ireland. Slope angles ranged from 4 to 16 degrees throughout the site. Slopes at the proposed borrow pit and turbine locations were selected for slope stability assessment in accordance with the principals of Eurocode 7 (IS EN 1997-1). Peat thicknesses recorded during the site walkover ranged from 0 to 3m with an average depth of 0.6m. The stability analysis for this project, which analysed the turbine locations, access roads and borrow pits indicated a satisfactory margin of safety.

The overall magnitude of the potential direct impacts associated with the construction phase of the proposed development, prior to mitigation, is considered to be a Short Term, Negative Impact of Slight to Moderate Significance.

Potential impacts during the operational phase of the Ballinagree Wind Farm include potential contamination to soils and groundwater as a result of accidental leaks and spills of oil from service vehicles and potential oil leaks from transformers at the proposed substation and at each proposed turbine. The magnitude of these potential impacts, prior to mitigation, is considered to be of Slight Significance.

The potential impacts associated with decommissioning will be similar to those associated with construction but of reduced magnitude

Potential cumulative impacts associated with land, soils, hydrogeology and geology are not considered to be significant as the surrounding area comprises agricultural farmland and forestry and the operational Boggeragh Wind Farm. It is unlikely that any activity associated with these land uses will give rise to cumulative effects on the existing geology and hydrogeology environments. There may be indirect cumulative impacts in terms of demands placed on local quarries for aggregate and concrete required during the construction phase of the development by placing demand on existing quarries during the construction phase. However, it is envisaged to use as much site-won material as possible therefore, the cumulative impact will be negligible.

## Mitigation Measures

Mitigation measures during construction include the development of a comprehensive surface water management system which is incorporated into the Construction Environmental Management Plan which is included in the EIAR.

Excavated material will be reused onsite for construction of access tracks, hardstands, landscaping and reinstatement, in order to avoid materials being transported off-site. These materials will be temporarily stored in a level area adjacent to the construction phase excavations prior to reuse.

To mitigate against the compaction of soil at the site, prior to the commencement of any earthworks, the work corridor will be pegged, and machinery will stay within this corridor so that peatland / soils outside the work area is not damaged. Excavations will then be carried out from access tracks, as they are constructed in order to reduce the compaction of soft ground.



To mitigate against erosion of the exposed soil or rock, all excavations will be constructed and backfilled as quickly as possible. Excavations will stop during or prior to heavy rainfall events. Stockpiles will be covered over during extreme rainfall to prevent any surface water contamination.

Likely impacts on land, soils and geology during the operational phase relate to potential spills and leakage of oils, chemicals and fuels. The magnitude of these potential impacts, prior to mitigation, is considered to be of Slight Significance. Storage tanks, used to store fuel for the various items of machinery, will be self-contained and double-walled. The management of oils and fuels will include:

- Oils and fuels on the construction site will be carefully handled to avoid spillage.
- Any spillage of fuels, lubricants or oils will be immediately contained and properly disposed of off-site.
- Waste oils and fuels will be collected in leak-proof containers and removed from the site for disposal.
- Appropriate spill control equipment will be kept in the construction area and in each item of machinery.

Mitigation measures applied during decommissioning activities will be similar to those applied during construction where relevant.

The proposed development is not expected to contribute to any significant, negative cumulative effects with other existing or known developments in the vicinity. Slight residual cumulative effects from the excavation of fill material from local quarries are considered to result from the proposed development by placing demand on existing quarries during the construction phase of the development. However, it is envisaged to use as much site-won material as possible therefore, the cumulative impact will be negligible.



## 10. HYDROLOGY AND WATER QUALITY

The wind farm site is situated within three sub-catchments. These are: Sullane\_SC\_020, Blackwater (Munster)\_SC\_050 and Blackwater (Munster)\_SC\_070.

The main hydrology features within the wind farm site are the Laney River, Nadanuller Beg and its tributaries. The northern eastern part of the windfarm site drains ultimately into the Nadanuller Beg Stream which forms Blackwater River (Cork/Waterford) Special Area of Conservation approximately 3.6km northeast of the site.

The National Indicative Fluvial Mapping shows the River Laney being vulnerable to fluvial flooding. The on-site substation and turbines are not located within a flood zone. The national flood hazard mapping (available at [www.floodmaps.ie](http://www.floodmaps.ie)) does not indicate any record of historical flooding on the wind farm site. There are no areas defined as 'benefitting lands' within the wind farm site in the Office of Public Works' flood hazard mapping.

It is proposed to construct one new bridge and one box culvert over the River Laney, and one box culvert over the Unnamed tributary of the River Laney, and one box culvert over the West Ballyagree Stream, which is also a tributary of the River Laney. The crossing structures will be designed to convey 1 in 100 years flow with 20% climate change allowance.

Water Framework Directive water quality status and river waterbody risk associated with the wind farm site, grid connection, turbine delivery route and biodiversity enhancement lands were examined. It was observed that the river status and waterbody risk of the receiving waters of the wind farm site, grid connection and biodiversity enhancement lands are classified as 'High' and 'Not At Risk'. The accommodation works relating to the turbine delivery route are unlikely to have any significant impact on hydrology and water quality due to the nature of the proposed activities and distance to watercourses.

The site is not situated within any environmentally designated areas, however it is hydrologically linked with the Blackwater River SAC (002170), approximately 4.5km downstream of the wind farm site.

Potential impacts on hydrology and water quality include impacts associated wind farm, grid connection, turbine delivery route (TDR) and biodiversity enhancement and management plant lands (BEMP) were examined.

Construction of new access tracks and upgrade of existing tracks, turbine hard-standing areas, the on-site substation and other new, hard surfaces have the potential to contribute to an increase in runoff. The effects of the increase in runoff have negligible magnitude on receiving waters because estimated increases in runoff are low compared to the flows of receiving waters. The overall estimated increase in the runoff due to the development is 0.483 m<sup>3</sup>/s (or 0.16 %) is not significant. The increased runoff will be mitigated with the proposed drainage system which is based on SuDS methodology.

During construction, there is the potential for sediment release into the receiving watercourses. Possible potential impacts on surface water quality during tree felling and construction activities include increased sediment in watercourses, increase in nutrients from tree felling, suspended solids and could affect aquatic fauna and habitats. Wet concrete could also affect receiving waters.

Due to the insignificance of the increase in runoff from the development, the grassing over the drainage swales and revegetation of other exposed surfaces, and the non-intrusive nature of site operations, there is a negligible risk of sediment release to the watercourses during the operational stage.



In the event of decommissioning, activities will take place in a similar fashion to the construction phase. Potential impacts will be similar to the construction phase but to a lesser degree. Any such potential impacts would be likely to be less than during the construction stage as the drainage swales would be fully mature and would provide additional filtration of runoff.

For access tracks and turbine foundations it is proposed that they are left in place. Access tracks will continue to be used for recreation, forestry and agriculture. Turbine hardstandings will be covered over with topsoil previously stripped and used for landscaping purposes during the construction stage and left to revegetate naturally. Removal of turbine foundations infrastructure would result in considerable disruption to the local environment in terms of an increased possibility of sedimentation. It is considered that leaving the turbine foundations hardstanding areas in-situ will cause less environmental damage than removing them. The recreational trails and associated signage shall be left in situ. The temporary accommodation works along the TDR will not be required for the decommissioning phase as turbine components can be dismantled on site and removed using standard HGVs. Grid connection infrastructure including the on-site substation and ancillary electrical equipment shall form part of the national grid and will be left in situ. It is expected that the measures implemented as part of the Biodiversity Enhancement and Management Plan will be left in perpetuity following the decommissioning phase of the project.

Mitigation includes the proposed drainage measures. Two distinct methods will be employed in the management of construction surface water runoff. The first method involves keeping clean water clean by avoiding disturbance to natural drainage features, minimizing any works in or around drainage features, and diverting clean surface water flow around excavations and construction areas. The second method involves collecting any drainage water from works areas within the site that might carry silt or sediment, and to route them towards settlement ponds prior to controlled diffuse release over vegetated natural surfaces. There will be no direct discharge to surface water.

The proposed measures will prevent the release of sediment into the watercourses to which the proposed development site drains. The main mitigation measures are the use of settlement ponds, silt fencing, monitoring of works by a suitably qualified person, silt traps, use of cross drains, swales, proper storage of fuels and oils and designated refuelling areas.

Before tree felling operations commence, an exclusion zone along the edge of all aquatic zones will be marked out. No tree felling machinery will be allowed to enter this area. Trees within this zone will be felled with a chainsaw.

When operational, the development will have a negligible effect on surface water quality as there will be no further disturbance of soils post-construction. It is not envisaged that the maintenance period will involve any significant impacts on the hydrological regime of the area. The maintenance of the development will incorporate effective maintenance of the drainage system.

Following the implementation of mitigation measures, the significance of the residual risk to the receiving watercourses would be 'Not significant' during the construction, operation and decommissioning stage of the development.

Due to the mitigation measures proposed, the residual and cumulative impacts of the proposed development on hydrology and water quality are not significant.



## 11. POPULATION, HUMAN HEALTH AND MATERIAL ASSETS

### 11.1 Population

The population of the wind farm area is 2,360 (2016 Census). The population density of the study area is far less than the state or county-wide average indicating a low population in the immediate area of the Ballinagree Wind Farm.

The construction stage will bring short-term/temporary population growth in the study area during working hours where an estimate of between 126 and 188 direct and indirect jobs. Of the projected employment, it is anticipated that an average workforce of 30 people will be directly employed at the wind farm site throughout the construction phase, increasing to 60 employees during peak periods. Therefore, the construction phase has potential to increase the population of the Main Wind Farm Site by between 2.3% and 2.5%. This growth is associated with daily construction work and therefore the population of the study area will increase daily during construction hours and return back to normal outside of working hours. It is unlikely that the construction stage will permanently impact population trends of the study area or grid route area.

The operational phase of the Ballinagree Wind Farm will potentially provide between 35 and 47 long term jobs. Although only a small proportion of these jobs are likely to be based in the study area, the operational phase will give rise to temporary, slight population increase in the study area during working hours as a result of operations and maintenance. This impact is expected to be imperceptible.

### 11.2 Socio-Economics

The study area has above average numbers of at-work population as well as below average numbers of unemployed population. Professional services and agriculture, forestry and fishing are the most common employment of the population based in the study area (Census 2016).

According to research conducted by the European Wind Energy Association and the Sustainable Energy Authority of Ireland, it is estimated that between approximately 126 and 188 direct and indirect jobs could be created during the construction stage of the project which is expected to last up to twenty four months. This will cause a direct short-term significant, positive impact on the local economy, bringing significant benefits to local service providers and businesses with a direct and indirect financial benefit to the local community. It is likely that there will be direct employment for people living in the Study Area who may be qualified for construction related roles. Materials will also be sourced in the locality where possible. This is likely to cause a short-term, positive impact on the employment profile of the area.

The operation phase of the Ballinagree Wind Farm has potential to provide between 35 and 47 long term direct and indirect jobs. Only a small proportion of these jobs are likely to be directly based in the study area. It is therefore considered that the operational phase of the proposed development has potential for an indirect, long-term slight positive impact on employment in the study area. Rates and development contributions paid by the developer will contribute significant funds to Cork County Council which will be used to improve the services available to the people of the County. Business rates will also contribute significantly throughout the lifetime of the windfarm.

Ballinagree Wind DAC aim to develop long-life assets in such a way to ensure long-term benefits to the local community and economy are created and sustained.



The applicant expects that for each megawatt hour (MWh) of electricity produced by the wind farm, the project will contribute €2 into a community benefit fund for the RESS period i.e., the first 15 years of operation and the developer has committed to a payment of €1 per MWh for the remaining lifetime of the wind farm. If this commitment is improved upon in upcoming Government Policy, the figures will be adjusted accordingly.

Assuming that the export capacity of the proposed development will be between 118MW and 132 MW and is contracted under the RESS, it is anticipated that the community benefit fund for the proposed Ballinagree Wind Farm has potential to deliver approximately €600,000 per year to the local community for the first 15 years of operations following the commissioning of the project, and approximately €300,000 per year for the remaining lifetime of the project.

The provision of the Community Benefit Fund will have a significant long-term, positive impact on the socio-economic profile of the study area and wider area, providing a regular payment to near neighbours of the project and providing for projects which will benefit the community as a whole, bringing long-term socio-economic benefits.

### 11.3 Land Use

The proposed development site comprises commercial forestry and areas of third party agricultural lands.

The existing land-uses in proximity to the proposed Ballinagree Wind Farm will remain broadly unchanged during the construction phase of the project and some land use within the site will be temporarily disrupted during the construction phase. This will occur on the forestry lands and the agricultural lands where turbines and associated infrastructure are proposed.

88 hectares of coniferous forest is required to be felled to accommodate the infrastructure of the wind farm and biodiversity enhancement measures. This will result in a long-term moderate, negative impact to forestry in the area.

Temporary effects on land use will also arise as a result of the installation of the grid connection along the grid route which will be constructed within the public road corridor. Full road closures will be put in place to facilitate cabling works in combination with lane closures, partial road closures and stop/go systems. This will allow for the works to be completed efficiently and minimise disruption time for residents. This will result in temporary slight, negative impact to residential and agricultural land use where access may be temporarily restricted. Traffic management measures will be put in place including single lane closures and the use of banksmen and signage, resulting in limited disruption to land use along the grid route.

TDR node upgrade activity has potential for slight, brief to temporary impacts to land use in proximity to each node. The majority of works have potential to cause non-significant brief impacts where street furniture and wall removal, temporary load bearing surfaces and vegetation trimming is required. Brief impact may also occur to the supply of electricity and telecommunications to homes and businesses as a result of temporary removal of services to accommodate turbine delivery.

Access to a section of the Duhallow Way National Waymarked Trail will be temporarily disrupted during the construction phase of the proposed development. This will result in moderate short-term, negative impact to recreation land use in and around the wind farm site.

The operational phase of the Ballinagree Wind Farm will result in a change of land use in areas where access tracks, wind turbine bases, hardstanding areas, met mast, substation, recreation trail and associated drainage infrastructure will be located. The lands affected are currently in use for commercial forestry and agriculture.



The removal of approximately 88 hectares of commercial forestry lands will have a long-term slight, negative impact on the existing forestry land use, however, the remaining surrounding forested area will continue its ongoing commercial maintenance, felling and replanting schedule throughout the operational life of the proposed project.

There will be 10 no. turbines located on or partly on agricultural lands. This will result in the change of use from agricultural pasture land to wind farm use. This will have a long-term slight, negative impact on agricultural land use due to the removal of grazing lands for the duration of the project.

Mitigation measures for land use are primarily related to preliminary design stage, which has allowed for the prevention of unnecessary or inappropriate ground works or land use alterations to occur. The construction and operational footprint of the proposed development has been kept to the minimum necessary to avoid impact on existing land uses as so far as possible.

. Construction and decommissioning works will be controlled by a detailed construction and environmental management plan. This will set out best practice methods to avoid impact on land uses in the area during these works. As part of these works, the public and other stakeholders will be provided with updates on construction activities which will affect access to lands. This will be communicated to members of the public through a community liaison officer employed for the duration of the construction period.

#### 11.4 Recreation, Amenity and Tourism

Overall, the most significant recreation activity/attractions currently available at the Ballinagree Wind Farm site is trail walking and hiking. Some of the existing archaeological sites in the area can be accessed from existing forestry trails and public roads. Through public consultation, angling was also found to be a popular recreation activity in the greater area with a local angling club established in nearby Macroom.

The Duhallow Way is a ca. 67km national waymarked trail and passes through areas of Counties Cork and Kerry. It forms a part of the European walking route E8 which links a number of Irish walking routes together to form a section of the European route. A section of the route passes through the proposed Ballinagree Wind Farm along the L2758 Butter Road, before entering Coillte lands in a northerly direction where it shares a section of track with the proposed wind farm.

The construction phase has potential to impact on recreation, amenity and tourism activities within the vicinity of the site. Approximately 1km of the Duhallow way will be utilised for access and construction activities during the construction phase of the proposed development. This section of the Duhallow Way will be closed to the public during the construction phase which is estimated to last between 18 and 24 months. Furthermore, noise, traffic and dust have potential to cause nuisance along the on-road area (L2750 Butter Road) of the Duhallow Way which comes in proximity to the proposed wind farm site. This is likely to have a short-term moderate, negative impact on the amenity of this section of walking trail if unmitigated. Proposed mitigation measures include the use of a diversion for the section of the Duhallow Way which passes through the wind farm site. This will direct walkers to an alternative route along adjacent existing access tracks in order for walkers to bypass the construction activity. Appropriate signage will be put in place to direct walkers. Notification of these diversions will be provided to Sport Ireland, Failte Ireland and Cork County Council.

Sections of forestry located at the south and north east of the wind farm site which are usually subject to Coillte's open forestry policy will be closed to the public during the construction phase. This is likely to have a short-term slight, negative impact on recreational use of the site. Furthermore, access to archaeological sites within or in close proximity to the wind farm site may be limited in the short-term due to construction activities.





Potential impact to angling activities could occur downstream of the site as a result of deterioration of water quality, due to construction works. Mitigation measures to protect watercourses have been proposed to avoid this.

The proposed development will include approximately 15km of upgraded or new access tracks which will be developed as walking trail routes throughout the wind farm site. This will include links to the existing sections of the Duhallow Way as well as providing users with a new section of trail to a viewing platform from the Duhallow Way, it is proposed to connect these trails to existing archaeological features throughout the site and supply archaeological and biodiversity heritage information boards, trail waymarks, trail viewing points and a trailhead carpark and picnic area. It is proposed to partially reinstate the southern construction compound for use as a trail head car park with up to 40 no. parking spaces for visitors. This enhancement of the walking and hiking infrastructure and the connection to heritage features throughout the site will result in a permanent moderate, positive impact to the existing recreation offering of the area and will have a permanent slight, positive impact on the Duhallow Way.

The proposed development will be visible from Mount Hillary Looped Walk to the north of the site. This is a broad sweeping panorama that affords a view across much of the Boggeragh Mountains where existing wind energy developments are perceived as one of the more common upland land uses. The northern cluster of proposed turbines appear evenly spaced and in a legible manner, albeit they will generate some sense of visual clutter in combination with the existing Boggeragh and Carrigcannon turbines. Nonetheless, the proposed turbines will be distant background features and the significance of visual impact is considered to be 'Moderate-slight'. With respect to tourism and recreation, this is considered to have a long-term non-significant, neutral impact on the amenity of the Mount Hillary Looped walk due to the distance (10km) and presence of existing wind farms between the proposed development and the looped walk.

In relation to community facilities, the village of Ballinagree is the most proximate settlement to the proposed wind farm. As detailed in Chapter 15: Landscape & Visual, a 'moderate' impact of significance is associated with the settlement of Ballinagree which has the potential for near distance views of some of the turbines within the southern cluster. This is not expected to negatively impact on the amenity of the community facilities in the village. If consented, a community benefit fund will be associated with the project, as detailed above in section 11.2. This will likely benefit the village of Ballinagree in its community facilities, recreation facilities and amenities, resulting in a long-term moderate, positive impacts.

Decommissioning works will include removal of above ground structures including the turbines, mountings and fencing. During the works, forestry tracks and amenity trails in proximity to the site will be closed to the public to assure public safety. Similar to the construction phase, this is expected to have a short-term moderate, negative impact on recreational trail walking and hiking at the Ballinagree Wind Farm site.

Due to the temporary nature of the decommissioning phases of the Ballinagree Wind Farm, it is expected to have an insignificant and temporary impact on recreation, amenity and tourism.

A residual permanent significant, positive impact on recreation, amenity and tourism is expected as a result of the provision of new and improved recreation facilities at the site which will remain after decommissioning of the wind farm development. Furthermore, the community benefits gained during the operational phase due to the capital investment in the area are expected to last beyond the decommissioning phase resulting in a residual permanent significant, positive impact on the amenities of the area.



## 11.5 Human Health

2016 Census Data indicates that the population of the study area is generally in good health with 90% of respondents stating they have good or very good health.

The construction works associated with the proposed development have potential to create health and safety hazards for both construction workers and the general public. Hazards may occur on site due to a range of construction activities. Potential health and safety hazards may occur on public roads and adjacent land uses including agricultural lands and forestry lands and associated recreation uses (forestry tracks) due to construction activities. If unmitigated, hazards may be caused by the presence of a construction crew, increased traffic, presence of heavy goods vehicles and machinery, potential obstructions on the public road and potential obstruction to recreation and amenity trails.

At the time of preparation of the EIAR, the COVID-19 virus represents a significant risk to human health. Similar to any construction site, potential for spread of the virus during the construction phase of the proposed development may occur due to potential transmission from worker to worker due to construction activities and potential for close quarter working conditions. Up to date HSE guidance will be consulted regularly in line with HSA recommendations and all reasonable on-site and travel precautions will be taken if COVID-19 remains a significant health issue during the construction phase.

No significant impacts on air quality have been identified with regard to the emissions of construction related traffic. The potential impacts from noise during the construction phase are expected to have a slight and temporary impact on nearby homes. Noise levels are not expected to exceed construction noise limits. A slope stability assessment was carried out which indicated that slopes have been considered stable in the long-term drainage conditions at the wind farm site. A flood risk assessment has been carried out and a drainage design has been incorporated into the proposed development. As a result, the proposed development is expected to have a negligible impact on flood risk in the surrounding area of the wind farm site or along the grid route and TDR. The increased surface water runoff due to development is not significant and these flows are further reduced with the proposed drainage system. The likely impact of flooding on human health and safety as a result of construction activities is therefore temporary and imperceptible.

Appropriate site safety measures will be used during the operational phase by all permitted employees. Wind turbines are equipped with a number of safety devices to ensure safe operation during their lifetime. This includes anti-vibration sensors which will detect ice build-up on a turbine and switch it off until the ice is removed. Shadow flicker detection systems will be put in place which will turn turbines off during the period in which shadow flicker may occur on a house. There is no likely impact to public safety or employee safety as a result of the proposed development provided that mitigation measures are in place. Improvement of walking trails throughout the site will result in a positive health gain with potential to provide a moderate positive impact to human health in the locality.

A literature review was carried out in relation to potential impacts of wind turbines on human health. It is concluded that there is no scientific consensus to support an association between negative health impacts and responsible wind turbine development. Therefore, the operation of the wind farm is expected to have a long-term, imperceptible, neutral impact on human health and safety.

The project was assessed in relation to its vulnerability to potential major accidents and natural disasters. This included an assessment of flooding, fire, landslides and major incidents involving dangerous substances. It is concluded that the potential susceptibility to natural disaster of the proposed Ballinagree Wind Farm is negligible.



The potential impacts associated with decommissioning phase in relation to human health will be similar to those associated with construction phase. Potential impacts to human health and safety on-site will be prevented through best practice methods. If unmitigated, hazards to the public may be caused by the presence of a construction crew, increased traffic, presence of heavy goods vehicles and machinery, potential obstructions on the public road and potential obstruction to recreation and amenity trails. Potential impact to public health and safety during the decommissioning phase is negative, moderate and temporary.

A Construction and Environmental Management Plan covering all aspects of the construction and decommissioning process will control site safety and other related issues. This plan will be prepared prior to construction and decommissioning and will include a traffic management plan. Best practice construction methods will be followed at all times. Public safety will be addressed by restricting access to the public in the vicinity of the site works during the construction and decommissioning stage. Appropriate signage and barriers will be utilised to raise awareness.

Access to electrical infrastructure will be prohibited during the operational phase. All personnel working on the site will be appropriately trained and will be equipped with the necessary protective equipment. Lightning conductors will be installed on each turbine and lights will be installed on each turbine as an aircraft safety precaution. Ice detection systems will be installed in each turbine to prevent turbines from rotating while ice is forming on a blade. A shadow flicker detection system will be installed on all turbines which will prevent shadow flicker from occurring at nearby homes. Noise control measures will be used in times of high winds to prevent excessive noise at nearby homes. Fire safety measures and equipment throughout the site will be kept in effective working order. Routine maintenance will take place.

Due to the significant setback distance, elimination of shadow flicker and noise control measures to reduce potential impacts on nearby homes as well as the mitigation measures set out throughout the EIAR, residual impact on human health is expected to be imperceptible.

Long-term positive residual impacts will occur due to the provision of clean, renewable electricity. The operation of the Ballinagree Wind Farm will result in the net displacement of between 132,414 and 148,125 tonnes of CO<sub>2</sub> per annum which would otherwise be emitted through the burning of fossil fuels.

## 11.6 Renewable Resources, Non-Renewable Resources and Utility Infrastructure

There are a number of disused quarries and mineral occurrences in the vicinity of the site. There is an active quarry nearby in Bweeng. It is proposed to haul construction materials from a nearby quarry within the vicinity of the proposed development. The quarries and pits within the vicinity of the proposed development provide sources of aggregates, hardcore, fill materials, washed sand and gravel, pebble sand aggregates and mortar. Ready mix concrete will be sourced from batching plants. In terms of other non-renewable resources within the site area, there is peat boglands located north of the east of the site and another area of peat bog to the north west of the site

Renewable resources in the area includes extensive forestry plantations.

Construction will impact on a natural resources such as aggregates (sand, gravel, crushed stone) which will be sourced from a nearby quarry. Up to 30,000m<sup>3</sup> of aggregate materiel will be taken from three onsite borrow pits located at the site, each consisting of approximately 10,000 m<sup>3</sup> of material. This will result in a slight, permanent negative impact on non-renewable resources of the area.



The removal of overhead utility infrastructure for turbine deliveries has the potential to cause a brief to temporary non-significant negative impact on nearby dwellings and commercial/industrial activities in the town of Millstreet. Other overhead utilities have been identified for temporary removal between Millstreet and the wind farm site, along the L2758 Butter Road. This has potential to cause a brief to temporary non-significant negative impact on nearby dwellings and farmsteads.

88 hectares of commercial forestry will be felled to accommodate the proposed development. Impact on renewable timber resources will be neutral due to replanting of forestry at an alternative site.

Once the Ballinagree Wind Farm is operational, the potential for negative effects on material assets is minimal. The direct effect of electricity generated by the proposed development will give rise to a reduction in the quantity of fossil fuels required for electricity generation across the State. This will give rise to a long-term positive impact and will contribute to reducing Ireland's dependency on imported fuel resources.

A setback distance has been applied between proposed turbines and existing high voltage overhead lines. No impact on existing major utility infrastructure is expected at the wind farm site during the operational phase.

Non-renewable resources such as aggregates and cement are required onsite during the construction phase. This will result in a permanent negative imperceptible residual impact on non-renewable resources.

The proposed development will result in a long-term slight positive residual impact on non-renewable resources by offsetting the use of fossil fuels in electricity generation over the lifetime of the project.

The proposed on-site substation and underground grid route cable will be taken in charge of by Eirgrid or ESB following decommissioning, providing a long-term slight positive residual impact on electricity infrastructure in the area.

Residual waste from the construction and decommissioning phases will be disposed of in a licenced waste facility. This will result in a permanent slight negative impact to capacity of licenced waste facilities in the area of the proposed development.



## 12. SHADOW FLICKER

Under certain conditions when the sun, a wind turbine and a receptor are in alignment, a shadow may be cast from the turbine onto the side of a building. If the turbine is rotating and the shadow from the blades pass over a window, to an occupant of the room it may appear that the light levels flicker. This effect is known as shadow flicker. Government guidelines recommend that shadow flicker should be limited to no more than 30 days a year or 30 minutes a day for any sensitive receptor within 500 m of a wind turbine. Other European guidance documents, however, state that shadow flicker effects may occur at up to 10 rotor diameters away from a turbine, therefore, the shadow flicker assessment for the proposed development has assessed shadow flicker effects for all residential and commercial properties within a 10 rotor diameter study area, which is equivalent to up to 1550 m from the nearest turbine. The shadow flicker assessment assesses the full range of turbine parameters proposed.

The assessment has considered the whole range of proposed turbine dimensions, including minimum and maximum tip heights, hub heights and rotor diameters. The assessment has calculated all times that shadow flicker could theoretically occur for all sensitive receptors for a range of scenarios and these times will be input into the shadow flicker control module within each turbine so that, if conditions for shadow flicker do occur, the turbines will automatically come to a gradual stop. Accordingly, the proposed development will meet the Government guidelines and the proposed method of mitigation will be used to mitigate all shadow flicker effects resulting in zero shadow flicker, allowing for a short time for the rotor to come to a stop.



## 13. TRAFFIC AND TRANSPORT

The construction of the project in its entirety is expected to take between 18 – 24 months. There are a number of items which will be conducted in parallel, but the basis of the construction programme will involve site establishment, site access road and drainage construction, hardstanding construction and substation works. The grid connection works are likely to be done in parallel with the site works and the turbine installation works will be completed before commissioning, reinstatement and landscaping. However, it is also possible that the grid route could commence prior to the on-site infrastructure or subsequent to the construction of the on-site infrastructure. Carrying out the grid connection works in parallel with the site works represents the worst case scenario.

The assessment has considered the whole range of proposed turbine dimensions, including minimum and maximum tip heights, hub heights and rotor diameters.

Ballinagree Wind Farm shall involve the use of 5 no. existing forestry and agricultural entrances as access points from the public road. These site entrances shall be developed in accordance with TII and Cork County Council design guidelines .

The underground grid route connection works to Clashavoon substation will involve the installation of ducting, joint bays and ancillary infrastructure and the subsequent running of cables predominantly along the existing road network. These works shall be undertaken on a rolling basis with short sections (up to several hundred metres in length) closed for short periods before moving onto the next section. This will require delivery of plant and construction materials to the sections along the route, followed by excavation, laying of cables and subsequent reinstatement of trenches and road surfaces. All road works will be subject to a road opening licence.

It is expected that full road closures will be put in place to facilitate cabling works in combination with lane closures, partial road closures and stop/go systems. This will enable the works to be completed as quickly and as safely as possible, with minimal disruption time for residents of the area.

In constructing the wind farm, materials and plant will need to be delivered to the site. The material haul routes will include a number of roads in the surrounding road network which will need to cater for the additional traffic associated with the project.

Large components associated with the wind farm construction will be transported to site via the identified turbine delivery route (TDR). The proposed access route to site is as follows:

- Loads will depart Foynes Port and east along the N69;
- Loads will join the N18 and travel east;
- Loads will exit at Junction 1 and travel south on the M20;
- Loads will depart the M20 and continue south on the N20;
- Loads will continue south on the N20 to Mallow;
- Loads will travel west along the N72;
- Loads will depart the N72 and travel onto the R583 at Dromtarriff;
- Loads will turn left at Millstreet onto the L1123 and continue to the site.



In some cases, accommodation works are required along the turbine delivery route such as hedge or tree cutting, relocation of powerlines/poles, lampposts, signage and local road widening.

The delivery of turbine components including blades, tower sections and nacelles is a specialist transport operation owing to the oversized loads involved. The blades are the longest component and therefore have been considered as the worst case scenario for the purpose of this assessment. Turbine component deliveries will be carried out during off-peak times and will be done using a convoy and a specialist heavy haulage company. Turbine deliveries will also be escorted by An Garda Síochána. This will ensure the impacts of the turbine deliveries on the existing road network are minimised.

All turbine blades will be carried on a superwing carrier which can extend and retract and has the ability raise the blade to avoid obstacles. The use of this carrier will reduce the need for mitigation in constrained sections of the route (i.e. avoid further temporary accommodation works). The assessment has assumed that the blade will be carried with a rear overhang of 17m, which is standard practice. It is proposed that the blade will be transferred to a Goldhofer blade lifting trailer from a temporary staging area at Drishane Castle, near Millstreet to the proposed wind farm site. This trailer has the ability to lift blades up to a maximum angle of 60 degrees, lifting blades over potential constraints and shortening the vehicle length.

Towers will be carried in a 4+7 clamp adaptor style trailer, whereas loads such as the hub, nacelle housing and drive train will be carried on a six axle step frame trailer.

The construction activities associated with the wind farm will lead to additional construction related traffic on the existing public road network over the duration of the construction works. These impacts will include:

- Heavy Goods Vehicles (HGVs) transporting materials to and from the site, including road making materials, concrete, building materials, drainage/ducting materials, cabling, electrical components, felled timber and excavated material.
- HGVs transporting conventional earthworks machinery such as excavators, dumper trucks and rollers.
- Fuel trucks transporting fuel for plant to each site compound during the construction phase
- Light Goods Vehicles (LGVs) such as cars, 4x4s and vans used by the workers and supervisory staff involved in the construction works.
- Oversized loads including turbine components.

The cable route construction works will involve constantly moving the working area as the cable installation works progress. Grid works within the public road corridor are estimated to take approximately 6 months on the assumption that an average of 75m of cable is installed each day. These works will lead to additional construction traffic associated with the cable route construction.

A number of measures will be employed during construction to reduce and minimise disruption to the public and road users. These measures include the following:

- A Traffic Management Plan to be implemented
- A Traffic Management Coordinator to be appointed
- Road pre-condition survey to be carried out
- Road reinstatement on completion of the works
- Site inductions – all workers will receive an induction
- 24-hour emergency contact



- Traffic management guidance – all temporary traffic management will be planned and executed in accordance with best practice
- Letter drops will be carried out to notify the public living nearby of upcoming traffic related measures
- Signage – clear signage relating to the development will be displayed
- Road sweeper – if necessary a road sweeper will be used
- Site entrance – the entrances will be secured when not in use and when necessary a flagman will be used.

Negative or adverse effects on the receiving environment associated with the construction works within the main wind farm site are considered to be short-term in duration and slight in significance following mitigation.

Negative or adverse effects on the receiving environment associated with the turbine delivery route are considered to be temporary and slight following mitigation.

Negative or adverse effects on the receiving environment associated with the grid connection route are considered to be short-term and slight following mitigation.

The trip generation for the development once operational is anticipated to be minimal. Effects on the receiving environment associated with the operation phase of the development are considered to be neutral in terms of quality, long-term in duration and imperceptible in significance.

Impacts associated with the decommissioning of the project will be similar in nature to the construction stage but of a much lower magnitude primarily due to the following key reasons:

- Wind farm access tracks will be left in-situ and reinstated using material from the site;
- The grid connection will form part of the grid network and will be left in place;
- Wind turbine components will be dismantled on site and can be removed on standard HGV's eliminating the requirement for temporary accommodation requirements needed at construction stage.

There are no significant cumulative impacts expected on the receiving environment as a result of other existing or proposed projects.





## 14. ARCHAEOLOGY, ARCHITECTURAL AND CULTURAL HERITAGE

### 14.1 Introduction

This chapter assesses the impacts of the proposed wind farm, grid connection, biodiversity enhancement and management areas and turbine delivery routes on the known and potential cultural heritage resource within their environs. The term ‘Cultural Heritage’ encompasses heritage assets relevant to both the tangible resource (archaeology, architecture heritage); and non-tangible resources (history, folklore, tradition, language, place names etc.).

### 14.2 Methodology

The methodology used for the assessment compiles with the EPA (2017) *Draft Guidelines for Information to be Contained in EIAR* as well as guidelines for the assessment of impacts on the cultural heritage resource published by the International Council on Monuments and Sites (ICOMOS 2011). The assessment was based on a programme of desk-based research combined with a number of site inspections undertaken to identify known and potential locations of features of archaeological, architectural or cultural heritage significance likely to be affected by the proposed development.

#### 14.2.1 Desktop Study

A desktop study of relevant published sources and datasets was carried out in order to identify all recorded and potential archaeological, architectural and other cultural heritage sites/features/areas within the study area. The principal sources reviewed for the assessment of the recorded archaeological resource were the Sites and Monuments Record (SMR) and the Record of Monuments and Places (RMP). The Record of Protected Structures (RPS) and the National Inventory of Architectural Heritage (NIAH) were consulted to determine the designated architectural heritage resource of the area. Details on the legal and planning frameworks designed to protect these elements of the cultural heritage resource are also provided in the chapter. The desktop study also included a review of other relevant published sources including literary and cartographic sources, archaeological and architectural heritage inventories, the Excavations Database, the Cork County Development Plan (2014), aerial and LiDAR imagery and folklore sources.

#### 14.2.2 Field Survey

The proposed development areas were inspected on a number of occasions and included surveys of the locations of proposed turbines, hardstands, internal access routes, compound, substation, borrow pits, grid connection, turbine delivery route work areas and biodiversity enhancement areas. The study area was assessed in terms of historic landscape, existing land use, vegetation cover and the potential for the presence of unrecorded archaeological sites and undesignated architectural heritage structures.

#### 14.2.3 Assessment of Impacts

The methodology used for the assessment of impacts compiles with the EPA (2017) *Draft Guidelines for Information to be Contained in EIAR* as well as guidelines for the assessment of impacts on the cultural heritage resource published by the International Council on Monuments and Sites (ICOMOS 2011).



## 14.3 Existing Environment

### 14.3.1 [Introduction](#)

A study area extending for 1km from the proposed locations of turbines, access roads, compounds, borrow pits and substations within wind farm site was reviewed in order to assess the potential for direct impacts on the cultural heritage resource. The wider landscape surrounding the proposed wind farm project was also reviewed to assess the potential for indirect impacts on National Monuments and other extant recorded monuments with potential visual alignments across the landscape, including megalithic tombs, stone circles and stone rows. The grid connection and turbine delivery routes along the existing public road network a BEMP lands were also assessed.

### 14.3.2 [Legal and Planning Context](#)

A concise summary of the legal and planning policy frameworks relevant to this assessment were examined in order to provide a context for the statutory protection assigned to the cultural heritage resource.

### 14.3.3 [Desktop Study](#)

#### *Wind Farm Site*

There are 14 known archaeological sites located within the boundary of the wind farm site and these range in date from prehistoric to post-medieval periods. There are 31 extant prehistoric monuments with potential visual alignments located in private lands within 5km of the site and a review of their locations and orientations, as recorded by the Archaeological Survey of Ireland, is presented within the chapter. In addition, a review of the lands extending for 10km from the wind farm site boundary revealed the presence of five National Monuments in State Ownership or Guardianship, including one example (CO049-007----/National Monument 660) located within the main wind farm site. The locations of all of these archaeological monuments are detailed within the chapter.

There are nine recorded prehistoric monuments within the boundary of the wind farm site, and these comprise two stone circles, three fulachta fia, one burnt mound, two stone rows and one standing stone. These monument types date to the Bronze Age and a number of other monuments from this period, including megalithic wedge tombs, are also located within the surrounding wider region. The presence of these monuments is indicative of a notable concentration of both ritual and domestic activities within, and in the environs of, the proposed wind farm site during this period. There is one early medieval ringfort within the wind farm site boundary which also contains a holy well site that may have its origins in this period. There is one recorded post-medieval archaeological site located within the boundary of the wind farm site and this comprises a roadside 18th-century country house, known as Carrigagulla House. In addition, the National Museum of Ireland topographical files record the discovery of four artefacts within townlands that extend into the boundary of the wind farm site.

The layout of the proposed development has been designed to avoid the locations of all known archaeological sites and their environs. A review of the alignment of the stone circles within the wind farm site was carried out in consultation with the Landscape and Visual specialists during the design phase of the project in order to avoid the siting of turbines that would directly impinge on these alignments. A review of the recorded National Monuments within 10km of the wind farm site was also carried out to assess their potential intervisibility with the wind farm location.

Cartographic sources dating from the 17<sup>th</sup> century onward were reviewed and indicate that the subject site comprised open, vacant heathland until 19<sup>th</sup> century land reclamation works to create field enclosures.



The consulted aerial/satellite images demonstrate that extensive areas within the proposed wind farm has been occupied by commercial forestry plantations since at least the 1990s. The reviewed LiDAR imagery indicates that the ground surface within the forestry have been extensively disturbed by planting and drainage works. No potential unrecorded archaeological sites or undesigned structures of architectural heritage potential were noted within the footprint of the proposed wind farm work locations during the review of these sources.

There are no buildings listed in the Record of Protected Structures or National Inventory of Architectural Heritage located within the environs of the wind farm site and it does not extend into an Architectural Conservation Area. There are no historic settlement centres, vernacular structures or demesne lands located within the footprint of the proposed construction areas and the townland names within the site boundary generally refer to natural topographical features. The Irish National Folklore Collection records a number of folklore traditions associated with known archaeological sites within the environs of the site.

### *Grid Connection*

There is one recorded archaeological site located on the public road network that will form the grid connection route and this comprises a 19th century masonry bridge known locally as Awboy Bridge. The required watercourse crossings along the route, including at this location, will be achieved by horizontal direction drilling within adjacent fields on the east side of the road and no interventions to any masonry bridges or associated watercourses will be required. There are no other recorded archaeological monuments within areas directly adjoining the public roads along the route. There are no Protected Structures located within the grid connection study area while the NIAH lists a late 19th century house and a wall-mounted post box adjacent to the public road that forms part of the route in Bawnmore townland.

### *Turbine Delivery Routes*

The turbine delivery route will extend to the wind farm site from Foynes, Co, Limerick. It will include the creation of a temporary staging area for the transfer of turbine blades within an agricultural field in the southern end of the Drishane Castle estate lands near Millstreet, Co. Cork. The temporary staging area will be located inside the southern boundary of the property and the topsoil layer on its footprint will be reduced and then reinstated upon completion of the staging works. This property contains a number of Protected Structures and recorded archaeological monuments, including a 15th-century Castle which is a National Monument in State Ownership (Nat. Mon. ref 296). In addition, the lands within the property are designated as an Architectural Conservation Area in the County Cork Development Plan (2014). The eastern access to the staging area will require a localised breach in a section of a modern boundary wall which has replaced the original random rubble estate wall in this area, which still survives along the public road further to the southwest. The exit from the location will be via an existing road. The location of the staging area is c.15m to the north of the extant boundary wall and does not contain any structures. A review of historic OS maps shows the staging area location as part of a vacant field.

The turbine delivery will require the removal of a small masonry road bridge structure within the site boundary and its replacement with a concrete bridge to facilitate transport loads. This structure comprises a stone built culvert feature located on a local road within the townland of Ballynagree East. The bridge is not listed as a Protected Structure, and it is also not included in the NIAH. A review of historic OS maps demonstrated that the local road is not present on the 1st edition 6-inch map (1830-40s series), which also does not depict a ford in the area, but it is shown on later map editions indicating that the road and the structure date to second half of the 19<sup>th</sup> century.



### *Biodiversity Enhancement Lands*

The biodiversity enhancement lands comprise areas where habitat will be managed to benefit Hen Harriers and other species of conservation importance. This will entail de-intensification of areas of managed grassland to improve the overall biodiversity value the lands and will include measures such as reduction of grazing, rush cutting, forestry felling and hedgerow management. There are three recorded archaeological sites located within open fields in the landholdings and these comprise two fulacht fiadh and one stone row.

#### 14.3.4 Field Survey

The wind farm site was visited on a number of occasions and proposed construction areas and the locations of known archaeological monuments were inspected. In general, the current use and layout of the lands within the wind farm site when compared to the detail shown on the historic OS maps demonstrates the extent of the 20th century interventions during the creation of the forestry plantations within former areas of open heath as well as the expansion of areas of improved pasture farmland. A number of small watercourses requiring bridging are located within the site and these will be achieved by clear span structures which will require no in-channel works. While there were no unrecorded archaeological monuments identified at the locations of proposed construction areas, a number of features of potential cultural heritage were noted, including a townland boundary and a possible relict field boundary feature of unknown date. A stone circle located within the site, which is a designated National Monument (CO049-007----/National Monument 660) is located within a small clearing in a section of forestry plantation near the east end of the site, which will remain in place for the duration of the proposed development. The forestry completely screens all views to and from its location. The field inspections confirmed that all other recorded archaeological monuments within the site remain extant in various states of preservation. The majority of the National Monuments located within 10km of the site are all in private lands that are not open to the public. An inspection of all their environs was carried out and views towards the wind farm site were found to be screened by a combination of natural topography within the wider landscape and tree-lined boundaries located within their environs.

No potential unrecorded archaeological sites were observed along the margins of the public road that forms the grid connection route. A pair of modern Famine memorial stone features were noted adjacent to both sides of the roadside at a crossroads in Killberriherth townland. While these are not of antiquity, they do comprise features of local cultural heritage significance. The grid connection within the adjacent public road will not extend into the footprint of either of these features.

An inspection of the location of the temporary staging area in the Drishane property revealed no potential unrecorded archaeological sites or structures of architectural heritage significance on the footprint of proposed works. An inspection of the small bridge feature in Ballynagree East to be removed to facilitate the turbine delivery route revealed it to comprise a pair of late 19<sup>th</sup> century culverts under the road surface. While the structure contains no elements that are of architectural heritage significance, it was concluded that it is of local cultural heritage interest.

## **14.4 Potential Impacts**

### Construction

#### *Wind Farm*

While there are 14 recorded archaeological sites within the wind farm site, none are located within 270m of the locations of any proposed turbines or within 100m of associated infrastructure. It is concluded that the construction phase will have no predicted direct or indirect impacts on the known archaeological resource.



The operational phase of the wind farm will result in a range of indirect impacts of a visual nature on the wider setting of the majority of the archaeological monuments which will range from not significant to significant and these are detailed in the chapter.

#### *Grid Connection Route*

The grid connection will comprise a buried cable within the existing road network and horizontal drilling under masonry bridges and associated watercourses which will result in no predicted direct or indirect impacts on the known cultural heritage resource during the construction or operational phases.

#### *Turbine Delivery Route*

The delivery of the turbines to the wind farm site will require the creation of a staging area within the Drishane Castle property which comprises an ACA and also forms the curtilage of a Protected Structure and National Monument which are located within lands further to the northwest. The construction of the staging area within the green field location will require topsoil stripping which has the potential to result in negative direct impacts of unknown magnitude on any such unrecorded archaeological remains that may exist within its footprint. The staging area will result in a short-term, direct, slight, negative impact on a modern boundary feature delimiting the original property boundary line. The creation of the staging area in an area of farmland within the demesne will result in a direct, negative, moderate impact on the curtilage but will have no direct impacts on any buildings or archaeological sites within the property or their close environs. These impacts will be reversed by the reinstatement of the area following completion of staging works.

The unnamed bridge feature to be removed as part of turbine delivery works in Ballynagree East townland is not listed in the Record of Protected Structure or the NIAH and is of likely post-1840s date. It also contains no features of architectural heritage significance and is a type of road culvert feature commonly found within the rural Irish landscape. The structure is assessed as being of local (low) cultural heritage significance its removal will result in a permanent, direct, negative impact of moderate significance.

#### *Biodiversity Enhancement Lands*

The proposed biodiversity enhancement measures for these lands entail a de-intensification of grazing use of lands within the environs of known monuments which will direct, slight, positive, long-term impact on the archaeological resource.

#### Operational Phase

The operational phase of the proposed development will result in no predicted direct impacts on the known archaeological, architectural and cultural heritage resources. Therefore, no mitigation measures are required. Some indirect visual impacts are predicted on the setting of nearby archaeological monuments; however, these impacts are reversible following decommissioning.

#### Decommissioning Phase

No direct impacts on known elements of the cultural heritage resource are predicted during the decommissioning phase while the removal of the turbines will reverse the indirect visual impacts on archaeological sites within surrounding lands. Therefore, no mitigation measures are required.



## Cumulative Impacts

A review of a number of developments was undertaken in order to assess the potential for cumulative impacts on the cultural heritage resource. These included surrounding forestry plantations and completed, permitted and proposed renewable energy developments within the surrounding landscape. The proposed development will not result in any predicted significant cumulative impacts on the cultural heritage resource in combination with these developments.

## 14.5 Mitigation Measures

The following section outlines the archaeological mitigation measures for the project. In the event that any subsurface archaeological remains are encountered during the site investigations detailed below, they will be cleaned, recorded and left *in situ* while the National Monuments Service are consulted to determine further appropriate mitigation measures, which may include preservation by avoidance or preservation by record through a systematic archaeological excavation.

### *Wind Farm*

The wind farm layout was informed by the archaeological desktop studies and fieldwork undertaken during the design and assessment phases and was adapted to avoid or minimise impacts on the known archaeological monuments in the area. The mitigation measures include a range of pre-construction archaeological site investigations to identify any potential unknown, subsurface archaeological remains. These measures entail geophysical surveys and test trenching within suitable open lands and archaeological monitoring of construction works within forestry plantations.

### *Grid Connection*

All ground works within undisturbed green field locations required as part of the grid connection will be subject to constant archaeological monitoring as will works within the environs of the Famine memorials at the crossroads in Killberrihert townland. An archaeological watching brief of other grid connection trench excavations within the public road will be carried out as part of the programme of licensed archaeological monitoring of the project.

### *Turbine Delivery Route*

The delivery of turbines to the wind farm site will require topsoil stripping within a green field area in the southern end of the Drishane Castle demesne lands in order to create a hardstand staging area. A pre-works geophysical survey followed by targeted archaeological test trenching will be carried out in advance of these ground works. Prior to the removal of the small, late 19<sup>th</sup> century road bridge/culvert in Ballinagree East townland to facilitate turbine delivery, an archaeological record of the structure, in written, drawn and photographic formats, will be carried out. All ground works at this location will then be subject to archaeological monitoring.



### *Biodiversity Enhancement Lands*

The proposals for biodiversity enhancement measures will not result in any predicted impacts on the cultural heritage resource and, therefore, no mitigation measures are required.

Mitigation measures for the operational and decommissioning phases will not be required.

## **14.6 Residual Impacts**

The mitigation measures presented in Section 14.5 will provide for either the preservation in situ of the potential unrecorded, sub-surface archaeological resource identified within the project area or the proper and adequate recording of this resource by full archaeological excavation. The project will result in a number of indirect, not significant to significant, negative, visual impacts on archaeological monuments located within the environs of the wind farm site which will be reversed during the decommissioning phase. The removal of the road bridge feature in Ballynagree East townland to facilitate the TDR, following the compilation of a detailed pre-works archaeological record of the structure, will result in a permanent, direct, negative residual impact of slight-moderate significance on the local, undesignated cultural heritage resource.

There are nine recorded archaeological sites located within 2km of the main wind farm site and none are located within 550m of proposed turbine locations. The extant standing stone (CW020-028----) within the study area is c.560m from the nearest turbine and is screened from the main wind farm site to the east by existing topography. The remaining archaeological sites within the study area are either levelled or partially levelled and possess no visual sensitivities such as alignments across the landscape. There will, therefore, be no predicted indirect impacts on the setting of the cultural heritage resource within 2km of the main wind farm site during the operational phase.

The recorded archaeological resource within an area extending for 10km from the proposed development was assessed to determine the presence of National Monuments and other monuments that may have potential visual alignments across the wider landscape. Three monuments with potential visual alignments within the hills to the southwest (cursus sites CW020-026---- & CW020-027---- and stone row CW020-017----) have low surface expressions and are not aligned towards the main wind farm site. The proposed development will result in not significant, indirect negative impacts on the setting of these monuments during the operational phase.

The assessment of visual impacts undertaken by the Landscape and Visual Impact Assessment consultant within the wider 20km area included a number of cultural heritage receptors accessible to the public. The assessment of the sensitivities and impacts on the cultural heritage receptors presented in that chapter were reviewed by the archaeological consultant during the assessment process. No significant operational phase visual impacts on these cultural heritage receptors were identified.

The grid connection will comprise a buried cable within the existing road network and will result in no predicted direct or indirect impacts on the cultural heritage resource during the operational phase.

No impacts relating to the turbine delivery route will arise during the operational phase.

A review of a number of developments was undertaken in order to assess the potential for cumulative impacts on the cultural heritage resource. These included a review of the surrounding forestry plantations and an existing wind farm to the east of the main wind farm site. The proposed project will not result in any predicted cumulative impacts on the cultural heritage resource in combination with these developments.



A systematic advance programme of archaeological site inspections will be undertaken within all development areas following pre-construction tree felling and this will be followed by monitoring of ground excavation works during the construction phase under licence by the National Monument Service. In the event that any previously unrecorded archaeological sites are identified they will be recorded and cordoned off while the National Monuments Service are consulted to determine further appropriate mitigation measures, which may include preservation by avoidance or preservation by record through a systematic archaeological excavation.

A programme of licensed archaeological monitoring of all ground excavation works within the environs of recorded archaeological sites as well as the Protected Structure in Kilnock townland and Drishane More will be carried out during the construction phase. An archaeological watching brief of ground excavation works will be maintained for the remainder of the grid connection works.

No residual impacts on the architectural heritage and undesignated cultural heritage resources are predicted to arise from the proposed project.





## 15. LANDSCAPE AND VISUAL

### 15.1 Introduction

The Landscape chapter describes the landscape context of the proposed Ballinagree Wind Farm and assesses the likely landscape and visual impacts of the scheme on the receiving environment. Although closely linked, landscape and visual impacts are assessed separately.

The assessment has considered the whole range of proposed turbine dimensions, including minimum and maximum tip heights, hub heights and rotor diameters.

**Landscape Impact Assessment (LIA)** relates to assessing effects of a development on the landscape as a resource in its own right and is concerned with how the proposal will affect the elements that make up the landscape, the aesthetic and perceptual aspects of the landscape and its distinctive character. **Visual Impact Assessment (VIA)** relates to assessing effects of a development on specific views and on the general visual amenity experienced by people. **Cumulative landscape and visual impact assessment** is concerned with additional changes to the landscape or visual amenity caused by the proposed development in conjunction with other developments (associated or separate to it), or actions that occurred in the past, present or are likely to occur in the foreseeable future.

The LVIA uses methodology as prescribed in the following guidance documents:

- Environmental Protection Agency (EPA) publication 'Guidelines on the Information to be contained in Environmental Impact Statements (Draft 2017) and the accompanying Advice Notes on Current Practice in the Preparation of Environmental Impact Statements (Draft 2015).
- Landscape Institute and the Institute of Environmental Management and Assessment publication entitled Guidelines for Landscape and Visual Impact Assessment – Third Addition (2013).
- Scottish Natural Heritage (SNH) Guidance Note: Cumulative Effect of Wind Farms (2012).
- Department of the Environment, Heritage and Local Government Wind Energy Development Guidelines (2006).
- Scottish Natural Heritage (SNH) Visual representation of wind farms: Best Practice Guidelines (version 2.2 - 2017).

### Study Area

The Wind Energy Development Guidelines published by the Department of the Environment, Heritage and Local Government (2006) specify different radii for examining the Zone of Theoretical Visibility of proposed wind farm projects (ZTV) based on turbine height. As the proposed turbines are greater than 100m tip height, the minimum ZTV radius recommended is 20 km from the outermost turbines of the scheme. Provision is also made to extend the study area to 25km to incorporate important receptors of national or international renown. In this instance, the important heritage receptor of Blarney Castle is located just over c.24km southeast of the site so it has been included within the study area.



## 15.2 Methodology

Production of this Landscape and Visual Impact Assessment involved baseline work in the form of desktop studies and fieldwork comprising professional evaluation by qualified and experienced Landscape. This entailed the following:

### Desktop Study

- Establishing an appropriate Study Area from which to study the landscape and visual impacts of the proposed wind farm;
- Review of a Zone of Theoretical Visibility (ZTV) map, which indicates areas from which the development is potentially visible in relation to terrain within the Study Area;
- Review of relevant County Development Plans, particularly with regard to sensitive landscape and scenic view/route designations;
- Selection of potential Viewshed Points (VPs) from key visual receptors to be investigated during fieldwork for actual visibility and sensitivity;

### Fieldwork

- Recording of a description of the landscape elements and characteristics within the Study Area.
- Selection of a refined set of VP's for assessment. This includes the capture of reference images and grid reference coordinates for each VP location for the visualisation specialist to prepare photomontages.

### Appraisal

- Consideration of the receiving landscape with regard to overall landscape character as well as the salient features of the study area including landform, drainage, vegetation, land use and landscape designations.
- Consideration of the visual environment including receptor locations such as centres of population and houses; transport routes; public amenities, facilities and heritage features and; designated and recognised views of scenic value.
- Consideration of design guidance and planning policies.
- Consideration of potentially significant effects and the mitigation measures that could be employed to reduce such effects.
- Assessment of the significance of residual landscape impacts.
- Assessment of the significance of residual visual impacts aided by photomontages prepared at all of the selected VRP locations.
- Assessment of cumulative landscape and visual effects in combination with other surrounding developments that are either existing, permitted or proposed.

The assessment has considered the whole range of proposed turbine dimensions, including minimum and maximum tip heights, hub heights and rotor diameters.



### 15.3 Receiving Environment

The principal landform within the study area is that of the Boggeragh Mountains which encloses the site to the north and east and creates a basin-like landscape formation in which much of the southern extents of the site is situated in. Musheramore mountain is the highest of the Boggeragh Mountains rising to a height of c.644m AOD and contains the westernmost portions of the proposal site. The northern areas of the site are situated across Seefin ridge which rises to a height of c.491m AOD, whilst Knockcraugh Hill rises to a height of c.434m AOD further to the east again. Other notable hilltops within the Boggeragh range include Mount Hillary (391m AOD) and Bweenduff (416m AOD), both of which are situated in the northeast quadrant of the wider study area. North and northwest of the site the elevated hills and ridges of the Boggeragh Mountains swiftly transition to a low rolling landscape where the terrain drains into numerous small rivers and streams that flow into the River Blackwater. The River Blackwater is the most prominent watercourse in the wider northern half of the study area where it flows in a general easterly direction entering the study area at the settlement of Rathmore and exiting it southwest of Mallow. The nearest river to the site is that of the River Laney which emerges on the east-facing hillside of Musheramore and passes directly through the proposal site and east of the settlement of Ballinagree.

The principal land uses within the study area is that of agricultural farmland bound by networks of mixed hedgerow vegetation. Much of the site and its immediate surrounds are contained in extensive conifer forest plantations which make a prominent imprint on the landscape of the study area and are often found carpeting transitional rolling hills and upland terrain. North and west of the site, the upland terrain is cloaked in areas of mountain moorland and rocky outcrops. A relatively modest rural population exists in the immediate site surrounds due to the upland nature of the terrain. The settlements of Millstreet, Kanturk, Macroom, and the outskirts of Mallow account for the most notable areas of urban land cover within the study area, whilst other anthropogenic landscape features include the linear transport corridors of the N72 and N22 situated on the study areas outer periphery. Several active quarries are also located throughout the wider study area.

The nearest centre of population in relation to the proposed development is the small rural village of Ballinagree situated c. 1.5km south of the nearest proposed turbine. The small village of Rylane is located just outside of the central study area along the L2758 local road some c. 5.5km east of the site. The small rural villages of Lyre and Nad are situated c. 5km to the north and northwest of the site, whilst the settlement of Rathcool is situated just over c. 8km to the north of the site. Situated along the Finnow River, Millstreet is the nearest large town to the proposed development and is located just over c. 8km to the northwest of the site at its nearest point. Macroom, one of the largest settlements within the 20km study area is located just north of the River Lee and is situated some c. 9km south of the proposal site at its nearest point.

The most notable major routes in relation to the proposed project include the N72, N22 and N20. All of these occur within the wider study area with the N22 the nearest of the three and situated just under 10km south of the nearest turbine where it passes through the settlement of Macroom. A modest network of regional roads also traverse the central and wider study area. The nearest of these to the project is the R579 regional road situated some c.2.8km northeast of the site at its nearest point. The site itself is bound by a network of local roads, the nearest of which is the L2758 which bisects the site in a general east-west direction. A number of other local roads and local road laneways also traverse the near surrounds of the site. A section of the national railway line passes through the northern half of the study area and is located just over 8km northwest of the site at its nearest point, where it passes north of the small village of Rathcool.

The study area also encompasses a notable number of tourism, heritage and recreational amenity features. One of the most notable of these is Blarney Castle which is situated outside of the principal study area (24km southeast) and is included as it is internationally renowned.



Other amenity and heritage features that occur within the central study area include the Blackwater Way (Duhallow), which passes directly through the site, whilst Millsteet County Park is situated some 2km west of the site. In terms of heritage features, St. Johns Well is situated on the western face of Musheramore Mountain just under 1km to the west of the site, whilst Drishane Castle is located to the north of the turbine delivery route and temporary storage area at the edge of its demesne lands. Other notable tourism, heritage and amenity features within the wider study area include the Slí Ghaeltacht Mhuscraí, Mount Hillary Loop Walk, Coachford Greenway, Farran Wood and The Gearagh.

## 15.4 Landscape Policy Context and Designations

### **Department of Environment, Heritage and Local Government Wind Energy Development Guidelines (2006)**

The Wind Energy Development Guidelines (2006) provide guidance on wind farm siting and design criteria for a number of different landscape types. The main wind farm site is considered to be located within a landscape that is generally consistent with the 'Transitional Marginal Landscapes' landscape type. However, as landscape types that are consistent with the 'Mountain Moorland' (along the higher peaks and ridges) and 'Hilly and Flat Farmland' (on lower ground north and south) landscape types are located within the study area the Guidelines recommend consideration of the advice for each landscape type rather than just that, which is considered to be most applicable. It should be noted that the Draft Revised Wind Energy Guidelines (2019) state the same policy with regard to landscape designations.

### **Cork County Development Plan 2014-2020**

A Landscape Character Assessment was undertaken as part of the Draft Cork Landscape Strategy (2007). This has been incorporated within the Cork County Development Plan (2014-2020) and divides the county into 16 No. Landscape Character Types (LCTs). The proposed development is principally situated in the easternmost extents of the Landscape Character Type LCT 15b – 'Ridged and Peaked Upland' although some turbines within the array straddle the southern portions LCT 14b – 'Fissured Marginal and Forested Rolling Upland' and the northern portions of LCT13a – 'Valleyed Marginal Middleground'. ) LCT15b and LCT14b are recognised as having; Medium landscape sensitivity and Medium Landscape Value, and a County and Local Landscape Importance respectively. LCT 13a is classified with a High landscape sensitivity; High Landscape Value; and County Landscape Importance.

Other LCTs that occur within the central study area include 'LCT 11 – Broad Marginal Middleground Valleys', 'LCT 10b Fissured Fertile Middleground'. LCT 10b is classified with a High landscape sensitivity; Medium Landscape Value; and County Landscape Importance whilst LCT 11 is categorised with a High landscape sensitivity; High Landscape Value; and Local Landscape Importance.

The current Cork CDP also identifies 'high value landscapes' within County Cork. This landscape designation is typically a consequence of landscapes that receive a 'very high' or 'high' sensitivity designation combined with a 'very high' or 'high' value and a 'county' or 'national' level importance. It should be noted that the proposed development is not situated in an area recognised as 'high value landscape (HVL)' and the nearest HVL designation relates to 'LCT 8 – Hilly River and Reservoir Valleys', which is located some c. 8.5km southeast of the site at its nearest point.

Policy relating to wind energy is also included within the current CDP. Section 9.3 of the Cork County Development Plan 2014 relates to onshore wind energy in Cork.



Whilst the proposed development site is not situated within an areas identified as ‘likely to be most suitable’, neither is it situated in an area designation as ‘important landscape (Medium or High)’. On figure 9.3 of the Cork County Development Plan, the proposed development is entirely situated in an area designated as ‘Open to Consideration’. These areas are “locations that may have potential for wind farm developments but there are also some environmental issues to be considered. This area has variable wind speeds and some access to the grid. Urban areas, metropolitan/town green belts, and Natural Heritage Areas (NHA’s) within this area are not generally considered suitable for wind farm developments”. The nearest ‘normally discouraged’ wind energy designation is situated to the north of the site and relates to the Blackwater River Special Area of Conservation (SAC). Although the site is not directly located within this designation, it is situated in the same visual context, and therefore it has the potential to influence the character of this area. The Draft Cork County Development Plan has also been examined and does not propose any changes to the Landscape Character Assessment, scenic designations and associated policies and objectives.

## 15.5 Mitigation Measures

Given the highly visible nature of commercial wind energy developments it is not generally feasible to screen them from view using on-site measures as would be the primary form of mitigation for many other types of development. Instead, landscape and visual mitigation for wind farms must be incorporated into the early stage site selection and design phases. In this instance, the two main forms of landscape and visual mitigation employed were:

- 1) Mitigation by avoidance and design - using Reverse ZTV technology

Macro Works have been involved in the proposed project since 2017 when early-stage feasibility studies took place. One of the main mitigation measures brought forward from these early-stage feasibility studies was to locate the southwestern cluster of the proposed development within the forested basin landform to the northwest of the village of Ballinagree, to reduce the visual exposure of the proposed project to receptors in the surrounding landscape. Whilst the design evolved to include an array of turbines along Seefin ridge to the north of the basin, it was still considered important to utilise the Musheramore ridge to screen the proposed development for visual receptors such as the scenic routes to the east of the site and from the settlement of Millstreet northwest of the site.

A series of design refinements saw the project range from 19 to 24 turbines at various tip heights and rotor diameters. Preliminary sets of visuals were produced comprising of wireframe montages representing a variety of receptors, viewing distances and viewing angles, which were compared on the basis of; the visual presence of the proposed turbines, the aesthetics of the proposed project, and the visual relationship of the proposed wind farm with the surrounding existing wind energy developments. Some of the more notable design refinements resulted in the removal of two turbines at the westernmost extents of the Ballinagree Basin turbine array as a consequence of reverse Zone of Theoretic Visibility (ZTV) maps which were produced from Millstreet and a section of the S20 scenic route and Blackwater Way (Duhallow). Both of these turbines were located to the west of the local road that runs across the eastern face of Musheramore ridge and were removed to reduce and eliminate the visibility of the proposed development from receptors in the western half of the study area. A final layout comprising 20 turbines at a max tip height of 185m was then generated from this iterative design process.



## 2) Buffering of Residential Receptors

For the proposed Ballinagree Wind Farm, the minimum distance of any turbine from the nearest residential receptor is 809m, which is in excess of the draft Wind Energy Development Guidelines (2019) minimum set back of 500m and the setback distance of 4 times the tip height of the proposed turbines. In this instance the setback for visual amenity purposes would be 740m from residential receptors on the basis of the 185m high turbines.

Variation in residential buffer distances within the nearest kilometre has a much more noticeable effect on perceived turbine scale than when it occurs in the context of more distant views. This is due to the law of perspective – that doubling the distance to an object halves its perceived height. The reduction factor is even more pronounced when considered in the context of the ‘swept area’ of turbine blades and not just their tip height.

### 15.6 Landscape Impact Assessment

There will be physical impacts on the land cover of the site as a result of this development, but these will be relatively minor in the context of the already modified context of the conifer forest plantations that typically carpet the main wind farm site.

The principal landscape impact will be the change in character of the immediate area due to the introduction of large scale structures with moving components. These will be a prominent and defining landscape feature within the local landscape as would be the case for a commercial scale wind farm placed into almost any landscape context. Nonetheless, this is a broad landscape context of upland mountains cloaked in moorland, broad rolling ridges lines and extensive conifer forest plantations. In this respect, the proposed wind farm will be well assimilated in terms of its scale and function surrounded by these large scale landscape features and broad land cover patterns of the central study area. The proposed wind farm will be a defining feature of the landscape character in the central study area, but it is not considered to be an unfamiliar feature within this robust and productive landscape upland setting that currently comprises of a number of large-scale wind energy developments. There will also be some minor landscape impacts associated with the construction of the on-site substation in addition to the grid connection.

Overall, it is not considered that the proposed wind farm will give rise to significant landscape impacts. Instead, the significance of landscape impacts is considered to be Moderate within the immediate context of the site (<5km). Thereafter, significance will reduce to Slight and Imperceptible at increasing distances as the development becomes a progressively smaller component of the wider landscape fabric. The assessment has considered the whole range of proposed turbine dimensions, including minimum and maximum tip heights, hub heights and rotor diameters.

### 15.7 Visual Impact Assessment

The visual impacts of the proposed Ballinagree Wind Farm development were assessed across 34 different viewpoints where the sensitivity of each receptor varied widely from Low to High. The higher levels of sensitivity often related to elevated views from the uplands, which afford vast panoramas over the landscape or alternatively, represent outdoor recreationalists. Medium-low sensitivity tends to be attributed to less remarkable views that contain a varied mix of anthropogenic land uses.



The significance of visual impacts for the ‘Centre of Population’, ‘Major Route’ and ‘Amenity and Heritage Features’ receptors are generally in the mid to low range aside from some sections of the Blackwater Way (Duhallow). Only in respect of the ‘Designated Scenic Routes’ and ‘Local Community Views’ are impacts considered to be higher, however, these impacts are not considered to be significant. It is also important to note, that none of these views classified with higher impacts are located within the ‘high value landscape’ designation in the current Cork County Development Plan 2014.

The most notable impacts are likely to occur along sections of the S20 scenic route which pass immediately north of the southern turbine cluster on the L2758 local road, and are representative of ‘Designated Scenic Routes’, ‘Local Community Views’ and ‘Amenity Features’. The proposed project will be one of the most prominent and distinctive features in the landscape from here, however, this is slightly diminished by the degree of roadside vegetation that occurs along the lower-lying sections of this route, and will have a notable screening effect. This is also only one small section of the overall S20 scenic route, which also encompasses large sections where the proposed turbines will be entirely screened. Nonetheless, when openly visible, the turbines will present as large-scale features and will have a highly dominant visual presence, but they are not considered to obstruct the views afforded from this scenic route. Some of the clearest and most prominent views of the proposed project will also be afforded from a local road laneway (VP15) that traverses the eastern and south-eastern slopes of Musheramore Mountain. Nonetheless, the proposed turbines are considered to be well accommodated in this broad working upland setting that is primarily characterised by upland land uses such as commercial conifer forestry, existing wind energy development and pastoral farmland. Furthermore, it is not considered that the proposed turbines will appear over-scaled here, especially in the context of the extensive areas of forestry and broad rolling upland hills that encompass the site and its surrounds. Despite the overall scale and broad visual envelope of the project when viewed from here, there is still a strong sense of visual permeability through the proposed project as a result of its relatively loose arrangement within the basin below, which is consistent with the Draft Wind Energy Development Guidelines 2019 which states “*irregular spacing is likely to be most appropriate, given the complexity of landform and land cover typical of these landscapes, and the absence of extensive swaths of fields of regular and rectilinear pattern*” in relation to the ‘Transitional Marginal Landscapes’ landscape type.

Overall, it is not considered that the proposed project will result in significant visual impacts, albeit there will be some localised areas in the immediate proximity of the southern turbine cluster that will experience impacts that are close to significant. Furthermore, this is a robust working upland context that is strongly characterised by existing extensive forestry and large-scale wind energy development. Thus, it is considered that the site and its surrounds can accommodate an additional large-scale wind energy development. The assessment has considered the whole range of proposed turbine dimensions, including minimum and maximum tip heights, hub heights and rotor diameters.

## 15.8 Cumulative Impact Assessment

With regard to cumulative effects, wind energy development has been an established landscape feature within the study area for the past decade, with more than 50 existing turbines located throughout the central study area, the predominance of which are located to the north and east of the proposed project.

The proposed Ballinagree turbines will almost always be viewed in combination with other wind energy developments, most notably the existing wind farm developments within the Boggeragh Mountains to the north and east of the site.



Due to the scale of the project, it is likely to generate some sense of wind farm proliferation within the Boggeragh Mountains, however, the Boggeraghs have a strong working character and are not considered to be highly unique on a regional or national level. From VP11, within the heart of the Boggeragh range, the proposed turbines will serve to occupy the only remaining undeveloped section of skyline to the southwest along this section of the local road, giving an increased sense of enclosure by wind farms. It should be noted that this is a remote section of local road which encompasses no residential dwellings. Further to the east and west along this local road, the proposed and permitted turbines are heavily screened by surrounding conifer forest plantations that abut the local road, and thus, this sense of enclosure will only be apparent for a short section of this route. Furthermore, any notable sense of enclosure is diminished by the broad valley that separates the proposed turbines from this local road section.

Overall, this is considered to be an intensively managed working landscape where wind existing energy development is already a strongly characteristic feature in combination with forest plantations and upland farming. The proposed Ballinagree Wind Farm is considered to contribute an additional cumulative effect that is in the order of High-medium within the Boggeragh Mountains, which will reduce to Low in the wider surrounds of the study area where the proposed turbines will appear as an extension to the existing developments within the Boggeraghs.

In respect of cumulative impacts with other forms of development, there are no other large scale developments within the vicinity of the wind farm site. To offset the felling of woodland within the site, replant lands are proposed at Kilkeany, Co. Waterford, Evikeens, Co. Roscommon, Coolnagun, Co. Westmeath, Castlerock, Co. Sligo, Boleyboy, Co. Leitrim, Ballinloughane, Co. Limerick and at Drumshinnagh, Co. Mayo. Whilst the addition of these replants land will generate a very minor degree of landscape and visual impacts in their own right, it is not considered that the replanting at of these sites will result in any cumulative impacts, particularly given that they are in different counties to the proposed Ballinagree wind farm.





## 16. TELECOMMUNICATIONS AND AVIATION

### 16.1 Telecommunications

In the context of wind farm development, electromagnetic interference is the impact of a wind farm on existing telecommunication services resulting in an unacceptable negative impact. The rotating blades of a wind turbine can occasionally cause interference to electro-magnetically-propagated signals. Not all signals are affected in the same way and some signals are more robust than others, however, such interference could, in theory, affect all forms of electromagnetic communications including:

- Satellite communications
- RADAR
- Cellular radio communications
- Aircraft instrument landing systems
- Air traffic control
- Terrestrial telecommunication links
- Television broadcasts

Wind Farms, their cable routes and the delivery of components to site can also impact on underground telecommunications and overhead lines.

As part of the EIAR scoping and consultation exercise, FT contacted the relevant national and regional broadcasters, fixed and mobile phone operators, aviation authorities and other relevant consultees.

The assessment has considered the whole range of proposed turbine dimensions, including minimum and maximum tip heights, hub heights and rotor diameters.

The Broadcasting Authority of Ireland, Three, Vodafone and ESB all responded confirming that the wind farm will not impact on their services. Ripplecom identified a potential impact on a main link to Cork City. No existing telecommunications infrastructure was found by the project team during a desk based survey within 2km of the proposed wind farm. According to the Comreg siteviewer<sup>1</sup>, the nearest telecommunication mast is located in the townland of Lacknahacknee where 4 no. operators share the infrastructure, approximately 3.2km southeast of the nearest turbine (T05). Three, Eir, Vodafone and Image operate from this mast. The combination of the findings of the consultation and desk based study confirms there will be no significant electromagnetic interference effect caused by the proposed project.

The temporary disconnection of overhead lines for the delivery of turbine components to the site will result in a temporary disruption to power and telecommunications services for existing residents and businesses. For the cable route, in advance of construction all underground cables will be identified and the installation of the wind farm cabling works will minimise conflicts with other services by achieving a minimum 300mm separation from existing services.

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<sup>1</sup> Comreg Siteviewer. <https://siteviewer.comreg.ie/#explore>



Mitigation measures consisted of mitigation by design to avoid impacts on telecommunication links. As there is no potential for electromagnetic interference from the proposed project on telecommunications, there are no mitigation measures proposed for the construction, operation or decommissioning phase of the proposed project

Overhead telecommunication lines along the TDR will be placed underground prior to turbine delivery or briefly disconnected during turbine delivery during the construction phase. Any interference to service will be brief (lasting less than 1 day) and potential effects to service will be communicated in advance to those affected. Notice will be provided to all stakeholders affected prior to works commencing.

The proposed grid connection will be left in situ underground within the public roadway.

In advance of the main grid connection works an assessment will be carried out to confirm the precise alignment of the cable route within the corridor which has been assessed. This will include slit trenching to ensure avoidance of existing services in the road.

## 16.2 Aviation

There is potential for aviation impacts during the late construction phase of a wind farm project and prior to the commissioning of the proposed project as the wind turbines are constructed and placed in situ. The turbines could be considered to be an obstacle to low flying craft.

The Irish Aviation Authority (IAA) requested that FT engage with Rathcoole Aerodrome and Kerry Airport. Both Kerry Airport and Rathcoole Aerodrome have confirmed that no impacts have been identified. The IAA also identified a potential impact of the proposed wind farm on Cork ILS 16 (Instrument Landing System). They requested an assessment be carried out by Flight Calibration Services Ltd, the IAA's flight calibration provider. The assessment identified no impact on Cork ILS 16.

Noting the presence of existing adjacent turbines to the proposed wind farm, the distances to existing airports and the confirmation of no concerns regarding obstacle limitation surface, it is considered therefore that there will be no likely effects on aviation from the proposed project during the construction phase.

In line with standard practice for wind farm developments, the coordinates and elevations for turbines will be supplied to the IAA at the end of the construction phase. An aeronautical obstacle lighting scheme will be agreed with IAA in line with IAA's consultation response and applied to the proposed turbines.



## 17. INTERACTIONS OF THE FOREGOING

The requirement for the identification of interactions between the various aspects of the environment as detailed throughout the EIAR is set out in Article 3(1) of the amended EIA Directive 2011/92/EU as amended by the Directive 2014/52/EU, which states the following:

The environmental impact assessment shall identify, describe and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of a project on the following factors:

- a) population and human health;
- b) biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC;
- c) land, soil, water, air and climate;
- d) material assets, cultural heritage and the landscape;
- e) the **interaction between the factors referred to in points (a) to (d).**

The Chapter considers the potential for interactions and inter-relationships between one aspect of the environment and another which can result in an impact being either positive or negative, as well as having varying significance. The chapter considers potential significant environmental effects that may occur in terms of Air Quality & Climate, Noise & Vibration, Biodiversity, Land, Soils & Geology, Hydrology & Water Quality, Population & Human Health, Material Assets, Shadow Flicker, Traffic & Transportation, Archaeology, Architectural & Cultural heritage, Landscape & Visuals and Telecommunications & Aviation, as a result of the proposed project as described in Chapter 3 of this EIAR.

Direct, indirect, cumulative, and interactive impacts were considered during the siting of the proposed turbines and associated infrastructure in order to minimise impacts on the environmental aspects mentioned above. The interactions and inter-relationships of the potential impacts as set out throughout this EIAR are detailed in this Chapter.

Each individual chapter of the EIAR has had regard to interactions between different potential impacts. For example, Hydrology & Water Quality has had regard to potential impacts on Biodiversity; and Land, Soils and Geology has had regard to potential impacts on both Biodiversity, Hydrology & Water Quality and Traffic & Transportation.

The proposed Ballinagree Wind Farm project has potential to impact on various environmental aspect as detailed throughout the EIAR. There are interactions and inter-relationships between these aspects. The EIAR has considered these interactions and inter-relationships throughout the assessment, firstly through the design of the wind farm site, grid connection route and turbine delivery route, to avoid impacts where possible and also in the definition of suitable mitigation measure to minimise potential impacts. It is therefore considered that the significant impacts associated with the interactions of environmental effects will be avoided due to the implementation of mitigation measures as detailed throughout the EIAR.

Table 17-1 herein provides a matrix detailing the key interactions and inter-relationships between the key environmental aspects of the proposed project, including the wind farm, grid connection route, turbine delivery route and biodiversity enhancement management plan lands.



**Table 17-1: Summary of Interactions between Key Environmental Aspects**

	Air Quality & Climate	Noise & Vibration	Biodiversity	Land, Soils, Hydrogeology & Geology	Hydrology & Water Quality	Population, Human Health & Material Assets	Shadow Flicker	Traffic & Transport	Archaeological, Architectural & Cultural Heritage	Landscape & Visual	Telecommunications & Aviation
Air Quality & Climate											
Noise & Vibration											
Biodiversity											
Land, Soils, Hydrogeology & Geology											
Hydrology & Water Quality											
Population, Human Health & Material Assets											
Shadow Flicker											
Traffic & Transport											
Archaeological, Architectural & Cultural Heritage											
Landscape & Visual											
Telecommunications & Aviation											

 = interaction or inter-relationship       = no interaction or inter-relationship



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